Chapter 5

Continuous Probability Models

5.1 Introduction

We have seen how *discrete* random variables can be modelled by discrete probability distributions such as the binomial and Poisson distributions. We now consider how to model *continuous* random variables.

A variable is discrete if it takes a *countable* number of values, for example, $r = 0, 1, 2, \ldots, n$ or $r = 0, 1, 2, \ldots$ or $r = 0, 0.1, 0.2, \ldots, 0.9, 1.0$. In contrast, the values which a continuous variable can take form a continuous scale. One simple example of a continuous variable is height. Although in practice we might only record height to the nearest cm, if we could measure height exactly (to billions of decimal places) we would find that everyone had a different height. This is the essential difference between discrete and continuous variables. Therefore, if we could measure the exact height of every one of the *n* people on the planet, we would find that, for any height *x*, the proportion of people of height *x* is either 1/n or 0. And if we imagine the number of people on the planet growing over time $(n \to \infty)$, this proportion tends to zero. This feature poses a problem for modelling continuous random variables as we can no longer use the methods we have seen work for discrete random variables.

The solution can be found by considering a (relative frequency) histogram of a sample of values taken by the continuous random variable, and thinking about what happens to the histogram as the sample size increases. For example, consider the following graphs which show histograms for samples of 100, 1000, 10000 and 100000 observations made on a continuous random variable which can take values between 0 and 20. The final graph shows what happens when the sample size becomes infinitely big. This final graph is called the *probability density function*.



As the population size gets larger, the histogram intervals get smaller and the jagged profile of the histogram smooths out to become a curve. We call this curve the *probability density function (pdf)* and it is usually written as f(x). Note that probabilities such as P(X < x) can be determined using the pdf as they equate to areas under the curve.

The key features of pdfs are

- 1. pdfs never take negative values
- 2. the area under a pdf is one: $P(-\infty < X < \infty) = 1$
- 3. areas under the curve correspond to probabilities
- 4. $P(X \le x) = P(X < x)$ since P(X = x) = 0.

Over the next two weeks we will consider some particular probability distributions that are often used to describe continuous random variables. We start with the most important, most widely-used statistical distribution of all time...

5.2 The Normal Distribution

5.2.1 Introduction

The *normal distribution* is possibly the best know and most used continuous probability distribution. It provides a good model for data in so many different applications – for example, the level of rainfall on a particular day, the height of people in a class, the IQ levels of the population as a whole. The outcomes of many production processes also follow normal distributions and hence it is used widely in industry.

Recall the "parameters" of the binomial and Poisson distributions: the binomial distribution has two parameters, n and p, and the Poisson distribution has one parameter, λ . The normal distribution has two parameters: the mean, μ , and the standard deviation, σ . Its probability density function (pdf) has a "bell shaped" profile:

The formula for the pdf is

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left\{-\frac{(x-\mu)^2}{2\sigma^2}\right\}.$$

Unlike the binomial and Poisson distributions, there is no simple formula for calculating probabilities. However, they can be determined using tables (see tables at the end of this chapter) or statistical packages such as Minitab (see our upcoming computer practical class).

There are four important characteristics of the normal distribution:

- 1. It is symmetrical about its mean, μ .
- 2. The mean, median and mode all coincide.
- 3. The area under the curve is equal to 1.
- 4. The curve extends in both directions to infinity (∞) .

Below are plots of the pdf for normal distributions with different values of μ and σ :



Note that the mean μ locates the distribution on the x-axis and the standard deviation σ affects the spread of the distribution, with larger values giving flatter and wider curves.

5.2.2 Notation

If a random variable X has a normal distribution with mean μ and variance σ^2 , then we write

$$X \sim N\left(\mu, \sigma^2\right)$$
.

For example, a random variable X which follows a normal distribution with mean 10 and variance 25 is written as $X \sim N(10, 25)$ or $X \sim N(10, 5^2)$. It is important to note that the second parameter in this notation is the *variance* and not the *standard* deviation.

5.2.3 The standard normal distribution

For various reasons, all probabilities for the normal distribution can be expressed in terms of those for a normal distribution with mean 0 and variance 1. Usually, a random variable with this *standard normal distribution* is called Z, that is

$$Z \sim N\left(0,1\right).$$

If our random variable follows a standard normal distribution, then we can obtain cumulative probabilities from statistical tables (see the table at the end of this chapter, which give "less than or equal to" probabilities). For example, if $Z \sim N(0, 1)$, then:

1. The probability that Z is less than -1.46 is P(Z < -1.46). Therefore we look for the probability in tables corresponding to z = -1.46: row labelled -1.4, column headed -0.06. This gives P(Z < -1.46) = 0.0721.

- 2. The probability that Z is less than -0.01 is P(Z < -0.01). Therefore we look for the probability in tables corresponding to z = -0.01: row labelled 0.0, column headed -0.01. This gives P(Z < -0.01) = 0.4960.
- **3.** The probability that Z is less than 0.01 is P(Z < 0.01). Therefore we look for the probability in tables corresponding to z = 0.01: row labelled 0.0, column headed 0.01. This gives P(Z < 0.01) = 0.5040.
- 4. The probability that Z is greater than 1.5 is P(Z > 1.5). Now our tables give "less than" probabilities, and here we want a "greater than" probability. But! The area under the curve is 1:

So we find P(Z < 1.5) = 0.9332 and subtract this from 1 to give **0.0668**.

5. What about the probability that Z lies between -1.2 and 1.5?



So how do we calculate probabilities for *any* normal distribution, not just the *standard* normal distribution for which we have tables? The easiest approach is to "make" the normal distribution that we have "look like" the standard normal distribution, and then we can just use the tables as before.

But how can we "make" *any* old normal distribution look like the *standard* normal distribution? We can use the "**slide–squash**" technique! This is best demonstrated through an example.

Example: IQ of graduates

An employer is interested in the IQ of it's graduate applicants, not only their degree classification. A previous study suggests a normal distribution with mean $\mu = 100$ and standard deviation $\sigma = 15$. Thus, we have:

X: IQ of graduate applicants, and

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X \sim N(100, 15^2).
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The distribution for IQs looks like this:

We don't have tables of probabilities for this distribution, but we do have tables for the *standard* normal distribution with mean 0 and standard deviation 1, which looks like:

N

So to make our distribution look like the *standard* normal distribution, we first need to *slide* it along to the left, and then *squash* it in so it has the same spread. For the *slide*, we subtract the mean from our distribution, i.e. subtract 100. Doing so centres the distribution on zero, just like the *standard* normal distribution. Then, for the *squash*,

we divide by the standard deviation (in this case 15), which squashes our normal distribution so it has the same spread as the *standard* normal distribution.

The formula for slide–squash, where $X \sim N(\mu, \sigma^2)$ and $Z \sim N(0, 1)$, is thus:

$$P(X \le x) = P\left(Z \le \frac{x-\mu}{\sigma}\right),$$

which transforms any normal distribution into the standard normal distribution. Thus, in the IQs example, let's suppose we wanted to find the probability that an 18–19 year old has an IQ less than 85, i.e. P(X < 85). Using the slide–squash formula, this is transformed into a statement about the standard normal distribution as follows:

$$P(X < 85) = P\left(Z < \frac{X - \mu}{\sigma}\right)$$
$$= P\left(Z < \frac{85 - 100}{15}\right)$$
$$= P(Z < -1)$$
$$= 0.1587.$$

What about:

- (i) The probability that a graduate applicant has an IQ less than 110?
- (ii) The probability that a graduate applicant has an IQ greater than 110?
- (iii) The probability that a graduate applicant has an IQ greater than 125?
- (iv) The probability that a graduate applicant has an IQ between 95 and 115?



Example 5.1

You work as part of the design team for a social networking website. You are interested in the amount of time, X seconds, it takes users of your website to download a video. A random sample of downloads gives a mean download time of 7 seconds, with a standard deviation of 2 seconds. What is the probability that it will take a user of your website in the future

- (a) more than 8.5 seconds;
- (b) less than 2.5 seconds;
- (c) between 2.5 and 8.5 seconds

to download this video?

Probability Tables for the Standard Normal Distribution

The table contains values of P(Z < z), where $Z \sim N(0, 1)$.

| | 0.00 | 0.00 | 0.07 | 0.00 | 0.05 | 0.04 | 0.00 | 0.00 | 0.01 | 0.00 |
|--|--|---|---|---|--|--|---|---|---|---|
| z | -0.09 | -0.08 | -0.07 | -0.06 | -0.05 | -0.04 | -0.03 | -0.02 | -0.01 | 0.00 |
| -2.9 | 0.0014 | 0.0014 | 0.0015 | 0.0015 | 0.0016 | 0.0016 | 0.0017 | 0.0018 | 0.0018 | 0.0019 |
| -2.8 | 0.0019 | 0.0020 | 0.0021 | 0.0021 | 0.0022 | 0.0023 | 0.0023 | 0.0024 | 0.0025 | 0.0026 |
| -2.7 | 0.0026 | 0.0027 | 0.0028 | 0.0029 | 0.0030 | 0.0031 | 0.0032 | 0.0033 | 0.0034 | 0.0035 |
| 2.1 | 0.0026 | 0.0027 | 0.0020 | 0.0020 | 0.0030 | 0.0001 | 0.0042 | 0.0033 | 0.0045 | 0.0047 |
| -2.0 | 0.0030 | 0.0037 | 0.0038 | 0.0039 | 0.0040 | 0.0041 | 0.0043 | 0.0044 | 0.0045 | 0.0047 |
| -2.5 | 0.0048 | 0.0049 | 0.0051 | 0.0052 | 0.0054 | 0.0055 | 0.0057 | 0.0059 | 0.0060 | 0.0062 |
| -2.4 | 0.0064 | 0.0066 | 0.0068 | 0.0069 | 0.0071 | 0.0073 | 0.0075 | 0.0078 | 0.0080 | 0.0082 |
| -2.3 | 0.0084 | 0.0087 | 0.0089 | 0.0091 | 0.0094 | 0.0096 | 0.0099 | 0.0102 | 0.0104 | 0.0107 |
| -22 | 0.0110 | 0.0113 | 0.0116 | 0.0119 | 0.0122 | 0.0125 | 0.0129 | 0.0132 | 0.0136 | 0.0139 |
| 0.1 | 0.0110 | 0.0116 | 0.0110 | 0.0110 | 0.0122 | 0.0120 | 0.0125 | 0.0102 | 0.0150 | 0.0100 |
| -2.1 | 0.0145 | 0.0140 | 0.0150 | 0.0134 | 0.0158 | 0.0102 | 0.0100 | 0.0170 | 0.0174 | 0.0179 |
| -2.0 | 0.0183 | 0.0188 | 0.0192 | 0.0197 | 0.0202 | 0.0207 | 0.0212 | 0.0217 | 0.0222 | 0.0228 |
| -1.9 | 0.0233 | 0.0239 | 0.0244 | 0.0250 | 0.0256 | 0.0262 | 0.0268 | 0.0274 | 0.0281 | 0.0287 |
| -1.8 | 0.0294 | 0.0301 | 0.0307 | 0.0314 | 0.0322 | 0.0329 | 0.0336 | 0.0344 | 0.0351 | 0.0359 |
| -1.7 | 0.0367 | 0.0375 | 0.0384 | 0.0392 | 0.0401 | 0.0409 | 0.0418 | 0.0427 | 0.0436 | 0.0446 |
| 1.6 | 0.0455 | 0.0465 | 0.0475 | 0.0485 | 0.0405 | 0.0505 | 0.0516 | 0.0526 | 0.0527 | 0.0548 |
| -1.0 | 0.0455 | 0.0403 | 0.0475 | 0.0485 | 0.0495 | 0.0303 | 0.0310 | 0.0520 | 0.0557 | 0.0348 |
| -1.5 | 0.0559 | 0.0571 | 0.0582 | 0.0594 | 0.0606 | 0.0618 | 0.0630 | 0.0643 | 0.0655 | 0.0668 |
| -1.4 | 0.0681 | 0.0694 | 0.0708 | 0.0721 | 0.0735 | 0.0749 | 0.0764 | 0.0778 | 0.0793 | 0.0808 |
| -1.3 | 0.0823 | 0.0838 | 0.0853 | 0.0869 | 0.0885 | 0.0901 | 0.0918 | 0.0934 | 0.0951 | 0.0968 |
| -1.2 | 0.0985 | 0.1003 | 0.1020 | 0.1038 | 0.1056 | 0.1075 | 0.1093 | 0.1112 | 0.1131 | 0.1151 |
| 1 1 | 0.1170 | 0.1100 | 0.1210 | 0.1230 | 0.1251 | 0 1271 | 0 1202 | 0.1314 | 0.1335 | 0.1357 |
| -1.1 | 0.1170 | 0.1100 | 0.1210 | 0.1250 | 0.1201 | 0.1271 | 0.1232 | 0.1514 | 0.1500 | 0.1507 |
| -1.0 | 0.1379 | 0.1401 | 0.1423 | 0.1446 | 0.1469 | 0.1492 | 0.1515 | 0.1539 | 0.1562 | 0.1587 |
| -0.9 | 0.1611 | 0.1635 | 0.1660 | 0.1685 | 0.1711 | 0.1736 | 0.1762 | 0.1788 | 0.1814 | 0.1841 |
| -0.8 | 0.1867 | 0.1894 | 0.1922 | 0.1949 | 0.1977 | 0.2005 | 0.2033 | 0.2061 | 0.2090 | 0.2119 |
| -0.7 | 0.2148 | 0.2177 | 0.2206 | 0.2236 | 0.2266 | 0.2296 | 0.2327 | 0.2358 | 0.2389 | 0.2420 |
| -0.6 | 0.2451 | 0.2483 | 0.2514 | 0.2546 | 0.2578 | 0.2611 | 0.2643 | 0.2676 | 0.2709 | 0.2743 |
| 0.5 | 0.2401 | 0.2400 | 0.2014 | 0.2040 | 0.2010 | 0.2011 | 0.2040 | 0.2015 | 0.2100 | 0.2140 |
| -0.5 | 0.2770 | 0.2810 | 0.2845 | 0.2877 | 0.2912 | 0.2940 | 0.2981 | 0.3015 | 0.3030 | 0.3085 |
| -0.4 | 0.3121 | 0.3156 | 0.3192 | 0.3228 | 0.3264 | 0.3300 | 0.3336 | 0.3372 | 0.3409 | 0.3446 |
| -0.3 | 0.3483 | 0.3520 | 0.3557 | 0.3594 | 0.3632 | 0.3669 | 0.3707 | 0.3745 | 0.3783 | 0.3821 |
| -0.2 | 0.3859 | 0.3897 | 0.3936 | 0.3974 | 0.4013 | 0.4052 | 0.4090 | 0.4129 | 0.4168 | 0.4207 |
| -0.1 | 0.4247 | 0.4286 | 0.4325 | 0.4364 | 0.4404 | 0.4443 | 0.4483 | 0.4522 | 0.4562 | 0.4602 |
| 0.0 | 0.4641 | 0.4691 | 0.4721 | 0.4761 | 0.4801 | 0.4840 | 0.4880 | 0.4020 | 0.4060 | 0.5000 |
| 0.0 | 0.4041 | 0.4001 | 0.4121 | 0.4701 | 0.4001 | 0.4640 | 0.4000 | 0.4320 | 0.4900 | 0.0000 |
| | | | | | | | | | | |
| | 0.00 | 0.01 | 0.00 | 0.00 | 0.04 | 0.05 | 0.00 | 0.07 | 0.00 | 0.00 |
| z | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
| <i>z</i> 0.0 | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 0.5359 |
| $\begin{array}{c}z\\0.0\\0.1\end{array}$ | $\begin{array}{c} 0.00 \\ 0.5000 \\ 0.5398 \end{array}$ | $\begin{array}{r} 0.01 \\ 0.5040 \\ 0.5438 \end{array}$ | $ \begin{array}{r} 0.02 \\ 0.5080 \\ 0.5478 \end{array} $ | $\begin{array}{r} 0.03 \\ 0.5120 \\ 0.5517 \end{array}$ | $\begin{array}{r} 0.04 \\ 0.5160 \\ 0.5557 \end{array}$ | $\begin{array}{r} 0.05 \\ 0.5199 \\ 0.5596 \end{array}$ | $\begin{array}{r} 0.06 \\ 0.5239 \\ 0.5636 \end{array}$ | $\begin{array}{r} 0.07 \\ 0.5279 \\ 0.5675 \end{array}$ | $\begin{array}{r} 0.08 \\ 0.5319 \\ 0.5714 \end{array}$ | $\begin{array}{c} 0.09 \\ 0.5359 \\ 0.5753 \end{array}$ |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | $\begin{array}{c} 0.00 \\ 0.5000 \\ 0.5398 \\ 0.5793 \end{array}$ | $\begin{array}{r} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \end{array}$ | $\begin{array}{r} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \end{array}$ | $\begin{array}{r} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \end{array}$ | $\begin{array}{r} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \end{array}$ | $\begin{array}{r} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \end{array}$ | $\begin{array}{r} 0.06 \\ 0.5239 \\ 0.5636 \\ 0.6026 \end{array}$ | $\begin{array}{r} 0.07 \\ 0.5279 \\ 0.5675 \\ 0.6064 \end{array}$ | $\begin{array}{r} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \end{array}$ | $\begin{array}{c} 0.09 \\ 0.5359 \\ 0.5753 \\ 0.6141 \end{array}$ |
| $\begin{array}{c c} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \end{array}$ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\end{array}$ | $\begin{array}{r} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \end{array}$ | $\begin{array}{r} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \end{array}$ | $\begin{array}{r} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \end{array}$ | $\begin{array}{r} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \end{array}$ | $\begin{array}{r} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \end{array}$ | $\begin{array}{r} 0.06 \\ 0.5239 \\ 0.5636 \\ 0.6026 \\ 0.6406 \end{array}$ | $\begin{array}{r} 0.07 \\ 0.5279 \\ 0.5675 \\ 0.6064 \\ 0.6443 \end{array}$ | $\begin{array}{r} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \end{array}$ | $\begin{array}{r} 0.09 \\ 0.5359 \\ 0.5753 \\ 0.6141 \\ 0.6517 \end{array}$ |
| $ \begin{array}{c c} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \end{array} $ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\end{array}$ | $\begin{array}{r} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6501 \end{array}$ | 0.02 0.5080 0.5478 0.5871 0.6255 0.6628 | $\begin{array}{r} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \end{array}$ | $\begin{array}{r} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \end{array}$ | $\begin{array}{r} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \end{array}$ | $\begin{array}{r} 0.06 \\ 0.5239 \\ 0.5636 \\ 0.6026 \\ 0.6406 \\ 0.6772 \end{array}$ | $\begin{array}{r} 0.07 \\ 0.5279 \\ 0.5675 \\ 0.6064 \\ 0.6443 \\ 0.6808 \end{array}$ | $\begin{array}{r} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \\ 0.6844 \end{array}$ | $\begin{array}{r} 0.09 \\ 0.5359 \\ 0.5753 \\ 0.6141 \\ 0.6517 \\ 0.6870 \end{array}$ |
| $ \begin{bmatrix} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \end{bmatrix} $ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6554\end{array}$ | $\begin{array}{r} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6591 \end{array}$ | $\begin{array}{r} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.6628 \end{array}$ | $\begin{array}{r} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.5910 \end{array}$ | $\begin{array}{r} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \end{array}$ | $\begin{array}{r} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.5980\end{array}$ | $\begin{array}{c} 0.06 \\ 0.5239 \\ 0.5636 \\ 0.6026 \\ 0.6406 \\ 0.6772 \\ 0.7$ | $\begin{array}{r} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.5157\end{array}$ | $\begin{array}{r} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \\ 0.6844 \\ 0.5100 \end{array}$ | $\begin{array}{r} 0.09 \\ 0.5359 \\ 0.5753 \\ 0.6141 \\ 0.6517 \\ 0.6879 \\ 0.579 \\ 0.5294 \end{array}$ |
| $\begin{array}{ c c c c }\hline z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ \hline \end{array}$ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915 \end{array}$ | $\begin{array}{r} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \end{array}$ | $\begin{array}{r} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.6985 \end{array}$ | $\begin{array}{r} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \end{array}$ | $\begin{array}{r} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \end{array}$ | $\begin{array}{r} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ \end{array}$ | $\begin{array}{r} 0.06 \\ 0.5239 \\ 0.5636 \\ 0.6026 \\ 0.6406 \\ 0.6772 \\ 0.7123 \end{array}$ | $\begin{array}{r} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\end{array}$ | $\begin{array}{r} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \\ 0.6844 \\ 0.7190 \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224 \end{array}$ |
| $\begin{array}{ c c c c }\hline z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ \hline \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324 \end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \end{array}$ | $\begin{array}{r} 0.04\\ 0.5160\\ 0.5557\\ 0.5948\\ 0.6331\\ 0.6700\\ 0.7054\\ 0.7389\end{array}$ | $\begin{array}{r} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454 \end{array}$ | $\begin{array}{r} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ \end{array}$ | $\begin{array}{r} 0.09 \\ 0.5359 \\ 0.5753 \\ 0.6141 \\ 0.6517 \\ 0.6879 \\ 0.7224 \\ 0.7549 \end{array}$ |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\end{array}$ | $\begin{array}{c} 0.01 \\ \hline 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \end{array}$ | $\begin{array}{c} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.6985 \\ 0.7324 \\ 0.7642 \end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ \end{array}$ | $\begin{array}{c} 0.08 \\ \hline 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \\ 0.6844 \\ 0.7190 \\ 0.7517 \\ 0.7823 \end{array}$ | $\begin{array}{c} 0.09 \\ 0.5359 \\ 0.5753 \\ 0.6141 \\ 0.6517 \\ 0.6879 \\ 0.7224 \\ 0.7549 \\ 0.7852 \end{array}$ |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881 \end{array}$ | $\begin{array}{c} 0.01\\ 0.5040\\ 0.5438\\ 0.5832\\ 0.6217\\ 0.6591\\ 0.6950\\ 0.7291\\ 0.7611\\ 0.7910 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\end{array}$ | $\begin{array}{r} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \end{array}$ | $\begin{array}{r} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023 \end{array}$ | $\begin{array}{r} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051 \end{array}$ | $\begin{array}{r} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\end{array}$ | $\begin{array}{r} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\end{array}$ | $\begin{array}{r} 0.09 \\ 0.5359 \\ 0.5753 \\ 0.6141 \\ 0.6517 \\ 0.6879 \\ 0.7224 \\ 0.7549 \\ 0.7852 \\ 0.8133 \end{array}$ |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\end{array}$ | 0.01 0.5040 0.5438 0.5832 0.6217 0.6591 0.6950 0.7291 0.7611 0.7910 0.8186 | $\begin{array}{c} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.6985 \\ 0.7324 \\ 0.7642 \\ 0.7939 \\ 0.8212 \end{array}$ | 0.03 0.5120 0.5517 0.5910 0.6293 0.6664 0.7019 0.7357 0.7673 0.7967 0.8238 | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8239\end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\end{array}$ | $\begin{array}{r} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8078\\ 0.8340\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\end{array}$ | $\begin{array}{c} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8412\end{array}$ | 0.01 0.5040 0.5438 0.5832 0.6217 0.6591 0.6950 0.7291 0.7611 0.7910 0.8186 0.8428 | 0.02 0.5080 0.5478 0.5871 0.6255 0.6628 0.6985 0.7324 0.7642 0.7939 0.8212 0.8212 | 0.03 0.5120 0.5517 0.5910 0.6293 0.6664 0.7019 0.7357 0.7673 0.7967 0.8238 0.8485 | 0.04 0.5160 0.5557 0.5948 0.6331 0.6700 0.7054 0.7389 0.7704 0.7995 0.8264 0.8264 0.8508 | 0.05 0.5199 0.5596 0.5987 0.6368 0.6736 0.7088 0.7422 0.7734 0.8023 0.8289 0.8281 | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\end{array}$ | 0.08 0.5319 0.5714 0.6103 0.6480 0.6844 0.7190 0.7517 0.7823 0.8106 0.8365 0.8365 | 0.09 0.5359 0.5753 0.6141 0.6517 0.6879 0.7224 0.7549 0.7852 0.8133 0.8389 0.8621 |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8413\end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8438 \end{array}$ | $\begin{array}{c} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.6985 \\ 0.7324 \\ 0.7642 \\ 0.7939 \\ 0.8212 \\ 0.8461 \\ 0.9666 \end{array}$ | 0.03 0.5120 0.5517 0.5910 0.6293 0.6664 0.7019 0.7357 0.7673 0.7967 0.8238 0.8485 | 0.04 0.5160 0.5557 0.5948 0.6331 0.6700 0.7054 0.7389 0.7704 0.7995 0.8264 0.8508 | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.95316\end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.5554\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.5250\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8365\\ 0.8599\\ 0.910\end{array}$ | $\begin{array}{c} 0.09 \\ 0.5359 \\ 0.5753 \\ 0.6141 \\ 0.6517 \\ 0.6879 \\ 0.7224 \\ 0.7549 \\ 0.7852 \\ 0.8133 \\ 0.8389 \\ 0.8621 \\ 0.9621 $ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643 \end{array}$ | $\begin{array}{c} 0.01\\ 0.5040\\ 0.5438\\ 0.5832\\ 0.6217\\ 0.6591\\ 0.6950\\ 0.7291\\ 0.7611\\ 0.7910\\ 0.8186\\ 0.8438\\ 0.8665 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8315\\ 0.8554\\ 0.8770 \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ \end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8365\\ 0.8599\\ 0.8810 \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ \end{array}$ |
| $\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849 \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8869 \end{array}$ | $\begin{array}{c} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.6985 \\ 0.7324 \\ 0.7642 \\ 0.7939 \\ 0.8212 \\ 0.8461 \\ 0.8686 \\ 0.8888 \end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8289 \\ 0.8531 \\ 0.8749 \\ 0.8944 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962 \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ \end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997 \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015 \end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032 \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8869 \\ 0.9049 \end{array}$ | $\begin{array}{c} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.6985 \\ 0.7324 \\ 0.7642 \\ 0.7939 \\ 0.8212 \\ 0.8461 \\ 0.8686 \\ 0.8888 \\ 0.9066 \end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8239\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131 \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ \end{array}$ | $\begin{array}{c} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \\ 0.6844 \\ 0.7190 \\ 0.7517 \\ 0.7823 \\ 0.8106 \\ 0.8365 \\ 0.8599 \\ 0.8810 \\ 0.8997 \\ 0.9162 \end{array}$ | $\begin{array}{c} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\end{array}$ |
| $\begin{array}{c c} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192 \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8869 \\ 0.9049 \\ 0.9207 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.8888\\ 0.9066\\ 0.9222 \end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \end{array}$ | $\begin{array}{r} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115\\ 0.9265\end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292 \end{array}$ | $\begin{array}{c} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \\ 0.6844 \\ 0.7190 \\ 0.7517 \\ 0.7823 \\ 0.8106 \\ 0.8365 \\ 0.8599 \\ 0.8810 \\ 0.8997 \\ 0.9162 \\ 0.9306 \end{array}$ | $\begin{array}{c} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.915\\ 0.9177\\ 0.9319 \end{array}$ |
| $\begin{array}{c c} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9192\\ 0.932\end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8869 \\ 0.9049 \\ 0.9207 \\ 0.9345 \end{array}$ | $\begin{array}{r} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.8888\\ 0.9066\\ 0.9222\\ 0.9357\end{array}$ | 0.03 0.5120 0.5517 0.5910 0.6293 0.6664 0.7019 0.7357 0.7673 0.7967 0.8238 0.8485 0.8708 0.8907 0.9082 0.9236 0.9236 0.9370 | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \end{array}$ | $\begin{array}{r} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115\\ 0.9265\\ 0.9394 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418 \end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441 \end{array}$ |
| $\begin{array}{c c} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9322\\ 0.9192\\ 0.9322\\ 0.9152\end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8869 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9462 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.8888\\ 0.9066\\ 0.9222\\ 0.9357\\ 0.0474\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708\\ 0.8907\\ 0.9082\\ 0.9236\\ 0.9236\\ 0.9370\\ 0.9484 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.90251 \\ 0.9382 \\ 0.9405 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115\\ 0.9265\\ 0.9394\\ 0.9595\end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.92525\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.92525\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.6 \\ 1.7 \\ 1.5 \\ 1.6 \\ 1.6 \\ 1.6 \\ 1.7$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9452\\ \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8438 \\ 0.8665 \\ 0.8438 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9464 \\ 0.9464 \\ 0.9464 \\ 0.9464 $ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.8888\\ 0.9066\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.8757\\ 0.9474\\ 0.9575\\ 0.9474\\ 0.9575\\ 0.9474\\ 0.9575\\ 0.9474\\ 0.9575\\ 0.9474\\ 0.9575\\ 0.9474\\ 0.9575\\ 0.9474\\ 0.9575\\ 0.9474\\ 0.9575\\ 0.9474\\ 0.9575\\ 0$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \\ 0.9370 \\ 0.9484 \\ 0.9370 \\ 0.9484 \\ 0.5552 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9495 \\ 0.9382 \\ 0.9495 \\ 0.9495 \\ 0.9561 \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8238 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9505 \\ 0.9505 \\ 0.9505 \\ 0.9505 \\ 0.5506 $ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.8554\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8590\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.8556\\ 0.9525\\ 0.8556\\ 0.9525\\ 0.8556\\ 0.9525\\ 0.8556\\ 0.9555\\ 0.8556\\ 0.9555\\ 0$ | $\begin{array}{c} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \\ 0.6844 \\ 0.7190 \\ 0.7517 \\ 0.7823 \\ 0.8106 \\ 0.8365 \\ 0.8365 \\ 0.8369 \\ 0.8361 \\ 0.8997 \\ 0.9162 \\ 0.9306 \\ 0.9429 \\ 0.9535 \\ 0.9535 \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554 \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8869 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9564 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.8888\\ 0.9066\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \\ 0.9370 \\ 0.9484 \\ 0.9582 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115\\ 0.9265\\ 0.9394\\ 0.9505\\ 0.9599\end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608 \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ \end{array}$ | $\begin{array}{c} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ \end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641 \end{array}$ | $\begin{array}{c} 0.01\\ 0.5040\\ 0.5438\\ 0.5832\\ 0.6217\\ 0.6591\\ 0.6950\\ 0.7291\\ 0.7611\\ 0.7910\\ 0.8186\\ 0.8438\\ 0.8665\\ 0.8869\\ 0.9049\\ 0.9207\\ 0.9345\\ 0.9463\\ 0.9564\\ 0.9649\\ \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.8888\\ 0.9066\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708\\ 0.8907\\ 0.9082\\ 0.9236\\ 0.9370\\ 0.9484\\ 0.9582\\ 0.9664 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115\\ 0.9265\\ 0.9394\\ 0.9505\\ 0.9599\\ 0.9678\\ \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ \end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9699\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706 \end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ \end{array}$ | $\begin{array}{c} 0.01\\ 0.5040\\ 0.5438\\ 0.5832\\ 0.6217\\ 0.6591\\ 0.6950\\ 0.7291\\ 0.7611\\ 0.7910\\ 0.8186\\ 0.8438\\ 0.8665\\ 0.8869\\ 0.9049\\ 0.9207\\ 0.9345\\ 0.9463\\ 0.9564\\ 0.9649\\ 0.9719\end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ \end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708\\ 0.8907\\ 0.9082\\ 0.9236\\ 0.9236\\ 0.9370\\ 0.9484\\ 0.9582\\ 0.9664\\ 0.9732 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115\\ 0.9265\\ 0.9394\\ 0.9505\\ 0.9505\\ 0.9599\\ 0.9678\\ 0.9744 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9706\\ 0.9767\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ \end{array}$ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9322\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8438 \\ 0.8665 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9564 \\ 0.9649 \\ 0.9719 \\ 0.9778 \end{array}$ | $\begin{array}{r} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9783\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708\\ 0.8907\\ 0.9082\\ 0.9236\\ 0.9370\\ 0.9484\\ 0.9582\\ 0.9664\\ 0.9732\\ 0.9788\end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9793 \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8289 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812 \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821 \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8438 \\ 0.8665 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9564 \\ 0.9649 \\ 0.9719 \\ 0.9778 \\ 0.9826 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.8888\\ 0.9066\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9783\\ 0.9680\\ 0.9783\\ 0.9830\\ 0$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \\ 0.9370 \\ 0.9484 \\ 0.9582 \\ 0.9664 \\ 0.9732 \\ 0.9788 \\ 0.9834 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.9251 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9793 \\ 0.9838 \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8289 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \\ 0.9748 \\ 0.9798 \\ 0.9842 \\ \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9803\\ 0.9803\\ 0.9846\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8365\\ 0.8399\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812\\ 0.9854 \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9817\\ 0.9857\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 1.2$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9821\\ 0.9621\end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8869 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9564 \\ 0.9649 \\ 0.9719 \\ 0.9778 \\ 0.9826 \\ 0.9826 \\ 0.9826 \\ 0.984 \\ \end{array}$ | $\begin{array}{c} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.6985 \\ 0.7324 \\ 0.7642 \\ 0.7939 \\ 0.8212 \\ 0.8461 \\ 0.8686 \\ 0.8888 \\ 0.9066 \\ 0.9222 \\ 0.9357 \\ 0.9474 \\ 0.9573 \\ 0.9656 \\ 0.9726 \\ 0.9783 \\ 0.9830 $ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \\ 0.9370 \\ 0.9484 \\ 0.9582 \\ 0.9664 \\ 0.9732 \\ 0.9788 \\ 0.9834 \\ 0.9834 \\ 0.9834 \\ 0.9871 \\ \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9793 \\ 0.9838 \\ 0.9793 \\ 0.9838 \\ 0.975 \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8239 \\ 0.8531 \\ 0.8749 \\ 0.8531 \\ 0.8749 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \\ 0.9842 \\ 0.979 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9846\\ 0.9846\\ 0.981\end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\\ 0.9854\end{array}$ | $\begin{array}{c} 0.08 \\ 0.5319 \\ 0.5714 \\ 0.6103 \\ 0.6480 \\ 0.6844 \\ 0.7190 \\ 0.7517 \\ 0.7823 \\ 0.8106 \\ 0.8365 \\ 0.8599 \\ 0.8810 \\ 0.8997 \\ 0.9162 \\ 0.9306 \\ 0.9429 \\ 0.9535 \\ 0.9625 \\ 0.9625 \\ 0.9625 \\ 0.9699 \\ 0.9761 \\ 0.9812 \\ 0.9854 \\ 0.987 \end{array}$ | $\begin{array}{c} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9857\\ 0.9857\\ 0.9857\\ 0.9857\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 0.5$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9861\\ 0.9861\\ \end{array}$ | $\begin{array}{c} 0.01\\ 0.5040\\ 0.5438\\ 0.5832\\ 0.6217\\ 0.6591\\ 0.6950\\ 0.7291\\ 0.7611\\ 0.7910\\ 0.8186\\ 0.8438\\ 0.8665\\ 0.8869\\ 0.9049\\ 0.9207\\ 0.9345\\ 0.9463\\ 0.9564\\ 0.9564\\ 0.9649\\ 0.9719\\ 0.9778\\ 0.9826\\ 0.9864\\ 0.9864\\ 0.9649\\ 0.9719\\ 0.9778\\ 0.9826\\ 0.9864\\ 0.9864\\ 0.9649\\ 0.9719\\ 0.9778\\ 0.9826\\ 0.9864\\ 0$ | $\begin{array}{r} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.9262\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9783\\ 0.9830\\ 0.9868\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708\\ 0.8907\\ 0.9082\\ 0.9236\\ 0.9236\\ 0.9370\\ 0.9484\\ 0.9582\\ 0.9664\\ 0.9732\\ 0.9664\\ 0.9732\\ 0.9788\\ 0.9834\\ 0.9871\\ 0$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9793 \\ 0.9838 \\ 0.9875 $ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115\\ 0.9265\\ 0.9394\\ 0.9505\\ 0.9599\\ 0.9678\\ 0.9744\\ 0.9798\\ 0.9744\\ 0.9798\\ 0.9842\\ 0.9878\\ 0.988\\ $ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9846\\ 0.9881\\ 0$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\\ 0.9884\\ 0.9850\\ 0.9884\\ 0.9854\\ 0.9884\\ 0.9854\\ 0.9884\\ 0.9854\\ 0.9884\\ 0.9854\\ 0.9884\\ 0.9854\\ 0.9884\\ 0.9854\\ 0.9884\\ 0.9854\\ 0.9884\\ 0.9854\\ 0.9884\\ 0.9854\\ 0.9884\\ 0$ | $\begin{array}{r} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812\\ 0.9854\\ 0.9887\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9857\\ 0.9890\\ 0.9857\\ 0.9890\\ 0.9555\\ 0.9633\\ 0.9766\\ 0.9767\\ 0.9817\\ 0.9857\\ 0.9890\\ 0.9557\\ 0.9890\\ 0.9555\\ 0.9633\\ 0.9766\\ 0.9767\\ 0.9857\\ 0.9890\\ 0.9557\\ 0.9890\\ 0.9555\\ 0.9635\\ 0.9555\\ 0.9635\\ 0.9555\\ 0.9655\\ 0$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 2.3 \\ \end{array}$ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6793\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9322\\ 0.9452\\ 0.9554\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9861\\ 0.9893\\ \end{array}$ | $\begin{array}{c} 0.01\\ 0.5040\\ 0.5438\\ 0.5832\\ 0.6217\\ 0.6591\\ 0.6950\\ 0.7291\\ 0.7611\\ 0.7910\\ 0.8186\\ 0.8438\\ 0.8665\\ 0.8869\\ 0.9049\\ 0.9207\\ 0.9345\\ 0.9463\\ 0.9564\\ 0.9564\\ 0.9649\\ 0.9719\\ 0.9778\\ 0.9826\\ 0.9864\\ 0.9896\end{array}$ | $\begin{array}{r} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.8888\\ 0.9066\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9726\\ 0.9783\\ 0.9830\\ 0.9888\\ 0.9898\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708\\ 0.8907\\ 0.9082\\ 0.9236\\ 0.9370\\ 0.9082\\ 0.9236\\ 0.9370\\ 0.9484\\ 0.9582\\ 0.9664\\ 0.9732\\ 0.9664\\ 0.9732\\ 0.9788\\ 0.9834\\ 0.9871\\ 0.9901 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9738 \\ 0.9738 \\ 0.9738 \\ 0.9875 \\ 0.9904 \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8239 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \\ 0.9744 \\ 0.9798 \\ 0.9842 \\ 0.9878 \\ 0.9906 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9846\\ 0.9881\\ 0.9909\\ \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\\ 0.9884\\ 0.9911\\ \end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812\\ 0.9854\\ 0.9887\\ 0.9913\\ \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9857\\ 0.9890\\ 0.9916\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 2.3 \\ 2.4 \\ \end{array}$ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9861\\ 0.9893\\ 0.9918\\ \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6591 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8438 \\ 0.8665 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9564 \\ 0.9649 \\ 0.9719 \\ 0.9778 \\ 0.9826 \\ 0.9864 \\ 0.9896 \\ 0.9920 \\ \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9726\\ 0.9783\\ 0.9868\\ 0.9898\\ 0.9898\\ 0.9922 \end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \\ 0.9370 \\ 0.9484 \\ 0.9582 \\ 0.9664 \\ 0.9732 \\ 0.9788 \\ 0.9871 \\ 0.9871 \\ 0.9901 \\ 0.9925 \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9793 \\ 0.9838 \\ 0.9875 \\ 0.9904 \\ 0.9927 \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8289 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \\ 0.9878 \\ 0.9878 \\ 0.9906 \\ 0.9929 \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9846\\ 0.9881\\ 0.9909\\ 0.9931\\ \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\\ 0.9884\\ 0.9911\\ 0.9932 \end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812\\ 0.9854\\ 0.9887\\ 0.9913\\ 0.9934 \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9857\\ 0.9890\\ 0.9916\\ 0.9936\end{array}$ |
| $\begin{array}{c c} z \\ \hline 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ \end{array}$ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9861\\ 0.9893\\ 0.9918\\ 0.9938\end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6591 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8438 \\ 0.8665 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9564 \\ 0.9649 \\ 0.9719 \\ 0.9778 \\ 0.9826 \\ 0.9864 \\ 0.9826 \\ 0.9864 \\ 0.9896 \\ 0.9920 \\ 0.9940 \\ \end{array}$ | $\begin{array}{c} 0.02 \\ 0.5080 \\ 0.5478 \\ 0.5871 \\ 0.6255 \\ 0.6628 \\ 0.7324 \\ 0.7642 \\ 0.7939 \\ 0.8212 \\ 0.8461 \\ 0.8686 \\ 0.9222 \\ 0.9357 \\ 0.9474 \\ 0.9573 \\ 0.9656 \\ 0.9726 \\ 0.9783 \\ 0.9656 \\ 0.9728 \\ 0.9783 \\ 0.9830 \\ 0.9868 \\ 0.9898 \\ 0.9922 \\ 0.9941 \\ \end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \\ 0.9370 \\ 0.9484 \\ 0.9582 \\ 0.9664 \\ 0.9732 \\ 0.9664 \\ 0.9732 \\ 0.9788 \\ 0.9834 \\ 0.9834 \\ 0.9871 \\ 0.9901 \\ 0.9925 \\ 0.9943 \\ \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9999 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9793 \\ 0.9838 \\ 0.9793 \\ 0.9875 \\ 0.9904 \\ 0.9927 \\ 0.9945 \\ \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8289 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \\ 0.9744 \\ 0.9798 \\ 0.9842 \\ 0.9878 \\ 0.9906 \\ 0.9929 \\ 0.9946 \\ \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9846\\ 0.9881\\ 0.9909\\ 0.9931\\ 0.9948\\ \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\\ 0.9884\\ 0.9911\\ 0.9932\\ 0.9949\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812\\ 0.9854\\ 0.987\\ 0.9913\\ 0.9934\\ 0.9951\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9817\\ 0.9857\\ 0.9890\\ 0.9916\\ 0.9936\\ 0.9952\end{array}$ |
| $\begin{array}{c c} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ \end{array}$ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9861\\ 0.9893\\ 0.9918\\ 0.9938\\ 0.9938\\ 0.9953\end{array}$ | $\begin{array}{c} 0.01\\ 0.5040\\ 0.5438\\ 0.5832\\ 0.6217\\ 0.6591\\ 0.6950\\ 0.7291\\ 0.7611\\ 0.7910\\ 0.8186\\ 0.8438\\ 0.8665\\ 0.8869\\ 0.9049\\ 0.9207\\ 0.9345\\ 0.9463\\ 0.9207\\ 0.9345\\ 0.9564\\ 0.9649\\ 0.9719\\ 0.9778\\ 0.9826\\ 0.9864\\ 0.9886\\ 0.98864\\ 0.9886\\ 0.9920\\ 0.9940\\ 0.9955\end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.9066\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9726\\ 0.9783\\ 0.9830\\ 0.9868\\ 0.9988\\ 0.9922\\ 0.9941\\ 0.9956\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708\\ 0.8907\\ 0.9082\\ 0.9236\\ 0.9370\\ 0.9484\\ 0.9582\\ 0.9664\\ 0.9732\\ 0.9664\\ 0.9732\\ 0.9788\\ 0.9834\\ 0.9871\\ 0.9901\\ 0.9925\\ 0.9943\\ 0.9957\end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9793 \\ 0.9838 \\ 0.9875 \\ 0.9904 \\ 0.9927 \\ 0.9945 \\ 0.9959 \end{array}$ | $\begin{array}{c} 0.05\\ 0.5199\\ 0.5596\\ 0.5987\\ 0.6368\\ 0.6736\\ 0.7088\\ 0.7422\\ 0.7734\\ 0.8023\\ 0.8289\\ 0.8531\\ 0.8749\\ 0.8944\\ 0.9115\\ 0.9265\\ 0.9394\\ 0.9505\\ 0.9599\\ 0.9678\\ 0.9744\\ 0.9798\\ 0.9744\\ 0.9798\\ 0.9842\\ 0.9878\\ 0.9906\\ 0.9929\\ 0.9946\\ 0.9906\end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9846\\ 0.9881\\ 0.9909\\ 0.9931\\ 0.9948\\ 0.9961\\ \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\\ 0.9884\\ 0.9911\\ 0.9932\\ 0.9949\\ 0.9962\end{array}$ | $\begin{array}{r} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9854\\ 0.9887\\ 0.9913\\ 0.9934\\ 0.9951\\ 0.9963\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9857\\ 0.9890\\ 0.9916\\ 0.9936\\ 0.9952\\ 0.9964 \end{array}$ |
| $\begin{array}{c c} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 0.7 \\ \end{array}$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6793\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9132\\ 0.9132\\ 0.9322\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9861\\ 0.9881\\ 0.9983\\ 0.9918\\ 0.9938\\ 0.9953\\ 0.9055\\ 0.905\\ 0.$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8869 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9564 \\ 0.9719 \\ 0.9778 \\ 0.9826 \\ 0.9864 \\ 0.9886 \\ 0.9920 \\ 0.9940 \\ 0.9955 \\ 0.9056 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.7324\\ 0.7642\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9726\\ 0.9783\\ 0.9656\\ 0.9726\\ 0.9783\\ 0.9830\\ 0.9868\\ 0.9898\\ 0.9922\\ 0.9941\\ 0.9956\\ 0.9057\end{array}$ | $\begin{array}{c} 0.03\\ 0.5120\\ 0.5517\\ 0.5910\\ 0.6293\\ 0.6664\\ 0.7019\\ 0.7357\\ 0.7673\\ 0.7967\\ 0.8238\\ 0.8485\\ 0.8708\\ 0.8907\\ 0.9082\\ 0.9236\\ 0.9370\\ 0.9082\\ 0.9236\\ 0.9370\\ 0.9484\\ 0.9582\\ 0.9664\\ 0.9732\\ 0.9664\\ 0.9732\\ 0.9664\\ 0.9732\\ 0.9788\\ 0.9834\\ 0.9871\\ 0.9901\\ 0.9925\\ 0.9943\\ 0.9957\\ 0.9058\end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9793 \\ 0.9738 \\ 0.9793 \\ 0.9838 \\ 0.9875 \\ 0.9904 \\ 0.9927 \\ 0.9945 \\ 0.9959 \\ 0.9059 $ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8289 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \\ 0.9744 \\ 0.9798 \\ 0.9842 \\ 0.9878 \\ 0.9906 \\ 0.9929 \\ 0.9946 \\ 0.9960 \\ 0.9070 \\ \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9886\\ 0.9750\\ 0.9881\\ 0.9909\\ 0.9931\\ 0.9948\\ 0.9961\\ 0.9071\\ \end{array}$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\\ 0.9884\\ 0.9911\\ 0.9932\\ 0.9949\\ 0.9962\\ 0.9972\end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812\\ 0.9854\\ 0.9874\\ 0.9913\\ 0.9934\\ 0.9951\\ 0.9963\\ 0.9073\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9857\\ 0.9890\\ 0.9916\\ 0.9936\\ 0.9952\\ 0.9964\\ 0.9074 \end{array}$ |
| $\begin{array}{c c} z \\ 0.0 \\ 0.1 \\ 0.2 \\ 0.3 \\ 0.4 \\ 0.5 \\ 0.6 \\ 0.7 \\ 0.8 \\ 0.9 \\ 1.0 \\ 1.1 \\ 1.2 \\ 1.3 \\ 1.4 \\ 1.5 \\ 1.6 \\ 1.7 \\ 1.8 \\ 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.2 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.2 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.7 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.7 \\ 2.5 \\ 2.6 \\ 2.7 \\$ | $\begin{array}{c} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8643\\ 0.9032\\ 0.9192\\ 0.9322\\ 0.9322\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9861\\ 0.9881\\ 0.9938\\ 0.9918\\ 0.9938\\ 0.9953\\ 0.9965\\ 0.9655 \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6950 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8438 \\ 0.8665 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9649 \\ 0.9719 \\ 0.9778 \\ 0.9649 \\ 0.9719 \\ 0.9778 \\ 0.9826 \\ 0.9864 \\ 0.9896 \\ 0.9864 \\ 0.9896 \\ 0.9920 \\ 0.9940 \\ 0.9955 \\ 0.9966 \\ 0.9677 \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9726\\ 0.9783\\ 0.9830\\ 0.9868\\ 0.9898\\ 0.9922\\ 0.9941\\ 0.9956\\ 0.9676\end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \\ 0.9370 \\ 0.9484 \\ 0.9732 \\ 0.9664 \\ 0.9732 \\ 0.9664 \\ 0.9732 \\ 0.9788 \\ 0.9834 \\ 0.9871 \\ 0.9901 \\ 0.9925 \\ 0.9943 \\ 0.9957 \\ 0.9968 \\ 0.9677 \\ 0.9667 \\ 0.9677 \\ 0.9968 \\ 0.9677 \\ 0.9667 \\ 0.9677 \\ 0.9968 \\ 0.9677 \\ 0.9667 \\ 0.9677 \\ 0.9968 \\ 0.9677 \\ 0.9667 \\ 0.9677 \\ 0.9667 \\ 0.9677 \\ 0.9668 \\ 0.9677 \\ 0.9668 \\ 0.9677 \\ 0.9668 \\ 0.9677 \\ 0.9668 \\ 0.9677 \\ 0.9677 \\ 0.968 \\ 0.9677 \\ 0.968 \\ 0.9677 \\ 0.968 \\ 0.9677 \\ 0.968 \\ 0.9677 \\ 0.968 \\ 0.9677 \\ 0.968 \\ 0.9677 \\ 0.968 \\ 0.9677 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.968 \\ 0.9675 \\ 0.968 \\ 0.9$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7389 \\ 0.7704 \\ 0.7995 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9738 \\ 0.9738 \\ 0.9738 \\ 0.9738 \\ 0.9838 \\ 0.9875 \\ 0.9904 \\ 0.9927 \\ 0.9945 \\ 0.9959 \\ 0.9677 \\ 0.9677 \\ 0.9967 \\ 0.9677 \\ 0.9967 \\ 0.967 \\ 0.$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.6736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8289 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \\ 0.9842 \\ 0.9878 \\ 0.9906 \\ 0.9929 \\ 0.9946 \\ 0.9960 \\ 0.9970 \\ 0.9675 \\ 0.9676 \\ 0.9970 \\ 0.9676 \\ 0.9960 \\ 0.9970 \\ 0.9675 \\ 0.9675 \\ 0.9675 \\ 0.9675 \\ 0.9960 \\ 0.9960 \\ 0.9675 $ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.7764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9686\\ 0.9750\\ 0.9803\\ 0.9846\\ 0.9881\\ 0.9909\\ 0.9931\\ 0.9948\\ 0.9961\\ 0.9971\\ 0.9677\\ 0$ | $\begin{array}{c} 0.07\\ 0.5279\\ 0.5675\\ 0.6064\\ 0.6443\\ 0.6808\\ 0.7157\\ 0.7486\\ 0.7794\\ 0.8078\\ 0.8340\\ 0.8577\\ 0.8790\\ 0.8980\\ 0.9147\\ 0.9292\\ 0.9418\\ 0.9525\\ 0.9616\\ 0.9693\\ 0.9756\\ 0.9808\\ 0.9850\\ 0.9850\\ 0.9884\\ 0.9911\\ 0.9932\\ 0.9949\\ 0.9962\\ 0.9972\\ 0.9672\\ 0$ | $\begin{array}{r} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9336\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812\\ 0.9854\\ 0.9854\\ 0.9854\\ 0.9854\\ 0.9854\\ 0.9951\\ 0.9934\\ 0.9951\\ 0.9963\\ 0.9733\\ 0.9973\end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9857\\ 0.9857\\ 0.9890\\ 0.9916\\ 0.9952\\ 0.9964\\ 0.9974\\ 0.9651\end{array}$ |
| $\begin{array}{c}z\\0.0\\0.1\\0.2\\0.3\\0.4\\0.5\\0.6\\0.7\\0.8\\0.9\\1.0\\1.1\\1.2\\1.3\\1.4\\1.5\\1.6\\1.7\\1.8\\1.9\\2.0\\2.1\\2.2\\2.3\\2.4\\2.5\\2.6\\2.7\\2.8\end{array}$ | $\begin{array}{r} 0.00\\ 0.5000\\ 0.5398\\ 0.5793\\ 0.6179\\ 0.6554\\ 0.6915\\ 0.7257\\ 0.7580\\ 0.7881\\ 0.8159\\ 0.8413\\ 0.8643\\ 0.8849\\ 0.9032\\ 0.9192\\ 0.9332\\ 0.9192\\ 0.9332\\ 0.9452\\ 0.9554\\ 0.9641\\ 0.9713\\ 0.9772\\ 0.9821\\ 0.9821\\ 0.9821\\ 0.9823\\ 0.9918\\ 0.9938\\ 0.9918\\ 0.9938\\ 0.9953\\ 0.9965\\ 0.9974 \end{array}$ | $\begin{array}{c} 0.01 \\ 0.5040 \\ 0.5438 \\ 0.5832 \\ 0.6217 \\ 0.6591 \\ 0.6591 \\ 0.7291 \\ 0.7611 \\ 0.7910 \\ 0.8186 \\ 0.8438 \\ 0.8665 \\ 0.8438 \\ 0.8665 \\ 0.9049 \\ 0.9207 \\ 0.9345 \\ 0.9463 \\ 0.9564 \\ 0.9649 \\ 0.9719 \\ 0.9778 \\ 0.9826 \\ 0.9826 \\ 0.9896 \\ 0.9896 \\ 0.9920 \\ 0.9940 \\ 0.9955 \\ 0.9966 \\ 0.9975 \\ \end{array}$ | $\begin{array}{c} 0.02\\ 0.5080\\ 0.5478\\ 0.5871\\ 0.6255\\ 0.6628\\ 0.6985\\ 0.7324\\ 0.7642\\ 0.7939\\ 0.8212\\ 0.8461\\ 0.8686\\ 0.9222\\ 0.9357\\ 0.9474\\ 0.9573\\ 0.9656\\ 0.9726\\ 0.9783\\ 0.9830\\ 0.9830\\ 0.9898\\ 0.9922\\ 0.9941\\ 0.9956\\ 0.9967\\ 0.9976\end{array}$ | $\begin{array}{c} 0.03 \\ 0.5120 \\ 0.5517 \\ 0.5910 \\ 0.6293 \\ 0.6664 \\ 0.7019 \\ 0.7357 \\ 0.7673 \\ 0.7967 \\ 0.8238 \\ 0.8485 \\ 0.8708 \\ 0.8907 \\ 0.9082 \\ 0.9236 \\ 0.9370 \\ 0.9484 \\ 0.9582 \\ 0.9664 \\ 0.9732 \\ 0.9788 \\ 0.9834 \\ 0.9834 \\ 0.9834 \\ 0.9834 \\ 0.9871 \\ 0.9901 \\ 0.9925 \\ 0.9943 \\ 0.9957 \\ 0.9968 \\ 0.9977 \\ \end{array}$ | $\begin{array}{c} 0.04 \\ 0.5160 \\ 0.5557 \\ 0.5948 \\ 0.6331 \\ 0.6700 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7054 \\ 0.7095 \\ 0.8264 \\ 0.8508 \\ 0.8729 \\ 0.8925 \\ 0.9099 \\ 0.9251 \\ 0.9382 \\ 0.9495 \\ 0.9591 \\ 0.9671 \\ 0.9738 \\ 0.9738 \\ 0.9838 \\ 0.9875 \\ 0.9904 \\ 0.9927 \\ 0.9945 \\ 0.9959 \\ 0.9969 \\ 0.9977 \\ \end{array}$ | $\begin{array}{c} 0.05 \\ 0.5199 \\ 0.5596 \\ 0.5987 \\ 0.6368 \\ 0.736 \\ 0.7088 \\ 0.7422 \\ 0.7734 \\ 0.8023 \\ 0.8289 \\ 0.8531 \\ 0.8749 \\ 0.8944 \\ 0.9115 \\ 0.9265 \\ 0.9394 \\ 0.9505 \\ 0.9599 \\ 0.9678 \\ 0.9744 \\ 0.9798 \\ 0.9744 \\ 0.9798 \\ 0.9842 \\ 0.9878 \\ 0.9906 \\ 0.9929 \\ 0.9946 \\ 0.9960 \\ 0.9970 \\ 0.9978 \\ \end{array}$ | $\begin{array}{c} 0.06\\ 0.5239\\ 0.5636\\ 0.6026\\ 0.6406\\ 0.6772\\ 0.7123\\ 0.7454\\ 0.764\\ 0.8051\\ 0.8315\\ 0.8554\\ 0.8770\\ 0.8962\\ 0.9131\\ 0.9279\\ 0.9406\\ 0.9515\\ 0.9608\\ 0.9608\\ 0.9608\\ 0.9750\\ 0.9803\\ 0.9803\\ 0.9846\\ 0.99803\\ 0.99846\\ 0.9931\\ 0.9909\\ 0.9931\\ 0.9948\\ 0.9961\\ 0.9971\\ 0.9979\end{array}$ | $\begin{array}{c} 0.07 \\ 0.5279 \\ 0.5675 \\ 0.6064 \\ 0.6443 \\ 0.6808 \\ 0.7157 \\ 0.7486 \\ 0.7794 \\ 0.8078 \\ 0.8370 \\ 0.8980 \\ 0.9147 \\ 0.9292 \\ 0.9418 \\ 0.9525 \\ 0.9616 \\ 0.9693 \\ 0.9756 \\ 0.9808 \\ 0.9850 \\ 0.9884 \\ 0.9911 \\ 0.9932 \\ 0.9949 \\ 0.9962 \\ 0.9972 \\ 0.9979 \\ \end{array}$ | $\begin{array}{c} 0.08\\ 0.5319\\ 0.5714\\ 0.6103\\ 0.6480\\ 0.6844\\ 0.7190\\ 0.7517\\ 0.7823\\ 0.8106\\ 0.8365\\ 0.8365\\ 0.8599\\ 0.8810\\ 0.8997\\ 0.9162\\ 0.9306\\ 0.9429\\ 0.9535\\ 0.9625\\ 0.9625\\ 0.9699\\ 0.9761\\ 0.9812\\ 0.9854\\ 0.9812\\ 0.9854\\ 0.9913\\ 0.9934\\ 0.9951\\ 0.9963\\ 0.9973\\ 0.9980\\ \end{array}$ | $\begin{array}{r} 0.09\\ 0.5359\\ 0.5753\\ 0.6141\\ 0.6517\\ 0.6879\\ 0.7224\\ 0.7549\\ 0.7852\\ 0.8133\\ 0.8389\\ 0.8621\\ 0.8830\\ 0.9015\\ 0.9177\\ 0.9319\\ 0.9441\\ 0.9545\\ 0.9633\\ 0.9706\\ 0.9767\\ 0.9817\\ 0.9817\\ 0.9857\\ 0.9890\\ 0.9916\\ 0.9936\\ 0.9952\\ 0.9964\\ 0.9974\\ 0.9981\\ \end{array}$ |

5.3 More Continuous Probability Models

Recently we have discussed some "standard" probability distributions which can be used to model data. We have looked at two such distributions for *discrete* data – the binomial distribution and the Poisson distribution – and last week the Normal distribution was introduced as a probability model for *continuous* data.

Recall the *probability density function* of the Normal distribution, which is often referred to as a "bell–shaped curve":



We saw in the lecture last week that many naturally occurring continuous measurements (such as height, weight, time, rainfall etc.) often resemble this bell–shaped curve when plotted using a histogram, for example. But what if we cannot assume "Normality" for our data?

We now consider two other probability models which can be used to model continuous data when the Normal distribution isn't appropriate.

5.3.1 The Uniform Distribution

The uniform distribution is the most simple continuous distribution. As the name suggests, it describes a variable for which all possible outcomes are equally likely. For example, suppose you manage a group of Environmental Health Officers and you need to decide at what time they should inspect a local hotel. You decide that any time during the working day (9.00 to 18.00) is okay but you want to decide the time "randomly". Here "randomly" is a short–hand for "a random time, where all times in the working day are equally likely to be chosen". Let X be the time to their arrival at the hotel measured in terms of minutes from the start of the day. Then X is a uniform random variable between 0 and 540:

As with the Normal distribution, the total area (base \times height) under the pdf must equal one. Therefore, as the base is 540, the height must be 1/540. Hence the probability density function (pdf) for the continuous random variable X is

$$f(x) = \begin{cases} \frac{1}{540} & \text{for } 0 \le x \le 540\\ 0 & \text{otherwise.} \end{cases}$$

In general, we say that a random variable X which is equally likely to take any value between a and b has a uniform distribution on the interval a to b, i.e.

$$X \sim U(a,b).$$

The random variable has probability density function (pdf)

$$f(x) = \begin{cases} \frac{1}{b-a} & \text{for } a \le x \le b\\ 0 & \text{otherwise} \end{cases}$$

and probabilities can be calculated using the formula

$$P(X \le x) = \begin{cases} 0 & \text{for } x < a \\ \frac{x-a}{b-a} & \text{for } a \le x \le b \\ 1 & \text{for } x > b. \end{cases}$$

We use this formula directly because it is fairly simple, unlike the Normal distribution for which we used tables of probabilities. Therefore, for example, the probability that the inspectors visit the hotel in the morning (within 180 minutes after 9am) is

$$P(X \le 180) = \frac{180 - 0}{540 - 0} = \frac{1}{3}.$$

The probability of a visit during the lunch hour (12.30 to 13.30) is

$$P(210 \le X \le 270) = P(X \le 270) - P(X < 210)$$

= $\frac{270 - 0}{540 - 0} - \frac{210 - 0}{540 - 0}$
= $\frac{270 - 210}{540}$
= $\frac{60}{540}$
= $\frac{1}{9}$.

Mean and Variance

The mean and variance of a continuous random variable can be calculated in a similar manner to that used for a discrete random variable. However, the specific techniques required to do this are outside the scope of this course and so we will simply state the results.

If X is a uniform random variable on the interval a to b then its mean and variance are

$$E(X) = \frac{a+b}{2}, \qquad Var(X) = \frac{(b-a)^2}{12}.$$

In the above example, we have

$$E(X) = \frac{a+b}{2} = \frac{0+540}{2} = 270,$$

so that the mean arrival of the inspectors is 9am + 270 minutes = 13.30. Also

$$Var(X) = \frac{(540 - 0)^2}{12} = 24300$$

and therefore $SD(X) = \sqrt{Var(X)} = \sqrt{24300} = 155.9$ minutes.

5.3.2 The Exponential Distribution

The exponential distribution is another common distribution that is used to describe continuous random variables. It is often used to model lifetimes of products and times between "random" events such as arrivals of customers in a queueing system or arrivals of orders. The distribution has one parameter, λ . If our random variable X follows an exponential distribution, then we say

$$X \sim \exp(\lambda).$$

Its probability density function is

$$f(x) = \begin{cases} \lambda e^{-\lambda x} & \text{for } x \ge 0, \\ 0 & \text{otherwise} \end{cases}$$

and probabilities can be calculated using

$$P(X \le x) = \begin{cases} 0 & \text{for } x < 0\\ 1 - e^{-\lambda x} & \text{for } x > 0. \end{cases}$$

The main features of this distribution are:

- 1. an exponentially distributed random variable can only take positive values
- 2. larger values are increasingly unlikely "exponential decay"
- 3. the value of λ fixes the rate of decay larger values correspond to more rapid decay.



Consider an example in which the time (in minutes) between successive users of a self-service shopping checkout can be modelled by an exponential distribution with $\lambda = 0.3$. The probability of the gap between users being less than 5 minutes is

$$P(X < 5) = 1 - e^{-0.3 \times 5} = 1 - 0.223 = 0.777.$$

Also the probability that the gap is more than 10 minutes is

$$P(X > 10) = 1 - P(X \le 10) = 1 - (1 - e^{-0.3 \times 10}) = e^{-0.3 \times 10} = 0.050$$

and the probability that the gap is between 5 and 10 minutes is

$$P(5 < X < 10) = P(X < 10) - P(X \le 5) = 0.950 - 0.777 = 0.173.$$

One of the main uses of the exponential distribution is as a model for the times between events occurring randomly in time. We have previously considered events which occur at random points in time in connection with the Poisson distribution. The Poisson distribution describes probabilities for the number of events taking place in a given time period. The exponential distribution describes probabilities for the times between events. Both of these concern events occurring randomly in time (at a constant average rate, say λ). This is known as a *Poisson process*.

Consider a series of randomly occurring events such as calls at a credit card call centre. The times of calls might look like



There are two ways of viewing these data. One is as the number of calls in each minute (here 2, 0, 2, 1 and 1) and the other as the times between successive calls. For the Poisson process,

- the number of calls has a Poisson distribution with parameter λ , and
- the time between successive calls has an exponential distribution with parameter λ .

Mean and Variance

The mean and variance of the exponential distribution can be shown to be

$$E(X) = \frac{1}{\lambda}, \qquad Var(X) = \frac{1}{\lambda^2}.$$

Example 5.2

According to Apple's technical support site, www.apple.com/support/itunes, downloading an iPod game using a broadband connection should take 3 to 6 minutes. Assuming that download times are uniformly distributed between 3 and 6 minutes, if you download a game what is the probability that the download time will be

- (a) less than 3 minutes 15 seconds?
- (b) More than 5 minutes?
- (c) More than 7 minutes?
- (d) What are the mean and standard deviation download times?

Example 5.3

Customers arrive at the drive–through window of a fast food restaurant at a rate of 2 per minute during the lunch hour.

- (a) What is the probability that the next customer will arrive within 1 minute?
- (b) What is the probability that the next customer will arrive within 20 seconds?
- (c) What is the mean time between arrivals at the drive-through window? What about the standard deviation?

5.4 Chapter 5 practice questions

- 1. A drinks machine is regulated by its manufacturer so that it discharges an average of 200ml per cup. However, the machine is not particularly accurate and actually discharges an amount that has a normal distribution with standard deviation 15ml.
 - (a) What percentage of cups contain below the minimum permissible volume of 170ml?
 - (b) What percentage of cups contain over 225ml?
 - (c) What is the probability that the cup contains between 175ml and 225ml?
 - (d) How many cups would you expect to overflow if 240ml cups are used for the next 10000 drinks?
- 2. A company promises delivery within 20 working days of receipt of order. However, in reality, they deliver according to a normal distribution with a mean of 16 days and a standard deviation of 2.5 days.
 - (a) What proportion of customers receive their order late?
 - (b) What proportion of customers receive their orders between 10 and 15 days of placing their order?
 - (c) How many days should the delivery promise be adjusted to if only 3% of orders are to be late?
 - (d) A new order processing system promises to reduces the standard deviation of delivery times to 1.5 days. If this system is used, what proportion of customers will receive their deliveries within 20 days?
- **3.** An express coach is due to arrive in Newcastle from London at 23.00. However, in practice, it is equally likely to arrive anywhere between 15 minutes early to 45 minutes late, depending on traffic conditions. Let the random variable X denote the amount of time (in minutes) that the coach is delayed.
 - (a) Sketch the pdf.
 - (b) Calculate the mean and standard deviation of the delay time.
 - (c) What is the probability that the coach is less than 5 minutes late?
 - (d) What is the probability that the coach is more than 20 minutes late?
 - (e) What is the probability that the coach arrives between 22.55 and 23.20?
 - (f) What is the probability that the coach arrives at 23.00?
 - (g) What is the probability that the coach arrives at 0.00?
 - (h) Do you think that this is a good model for the coach's arrival time?

5.4. CHAPTER 5 PRACTICE QUESTIONS

- 4. A network server receives incoming requests according to a Poisson process with rate $\lambda = 2.5$ per minute.
 - (a) What is the expectation of the time between arrivals of requests?
 - (b) What is the probability that the time between requests is less than 2 minutes?
 - (c) What is the probability that the time between requests is greater than 1 minute?
 - (d) What is the probability that the time between requests is between 30 seconds and 50 seconds?
- 5. As Production Manager, you are responsible for buying a new piece of equipment for your company's production process. A salesman from one company has told you that he can supply you with equipment for which the time to first breakdown (in months) follows an exponential distribution with $\lambda = 0.11$.

Another salesman (from another company) has told you that the time to first breakdown of their machines is also exponentially distributed but with $\lambda = 0.01$. It is very important that the equipment you purchase does not break down for at least six months.

Calculate the probability of this outcome for both suppliers and make a recommendation to the company board about which machine should be bought.

How might you take into account a difference between the prices for the machines?

- 6. Calls made to a Company's complaints hotline arrive according to a *Poisson* process with rate two per minute.
 - (a) Write down the distribution of X, the number of calls to the complaints hotline in any five minute period. Find E[X], and s.d.(X).
 - (b) Write down the distribution of Y, the time between successive calls to the complaints hotline in any five minute period. Find E[Y] and s.d.(Y).
 - (c) Use the distribution in part (a) to find the probability that there will be fewer than four calls made to the complaints hotline in any five minute period.
 - (d) Use the distribution in part (b) to find the probability that the time between any two successive calls to the complaints line is greater than ten seconds.
 - (e) This company has twenty branches throughout Northeast England. Each week, all employees at a particular branch receive a bonus if, on average, there have been less than four calls per five minutes to the complaints hotline. Find the probability that employees at fewer than two of the twenty branches receive a bonus.

- (f) This company manufactures notebook PCs. Weekly sales of their products via their website tend to be Normally distributed with mean $\mu = \pounds 7550$ and standard deviation $\sigma = \pounds 255$. Find the probability that weekly sales exceed $\mu + 2\sigma$.
- 7. In October 2010 model and celebrity Kate Moss endorsed the latest *Top Shop* women's clothing range, where she starred in an advertising campaign aimed at increasing sales (see pictures below © *TopShop* 2010). Total sales of women's clothing at a selection of *Top Shop* stores are summarised underneath for periods *before* and *after* this advertising campaign.



| $\bar{x}_{\text{Before}} = \pounds 21,300$ | $s_{\text{Before}} = \pounds 5,100$ |
|--|-------------------------------------|
| $\bar{x}_{\text{After}} = \pounds 24,900$ | $s_{\text{Before}} = \pounds 4,800$ |

Find the probability that sales at a randomly selected store exceed $\pounds 35,000$ in both the before and after periods, assuming a Normal distribution in both cases.

8. *www.feta-flights.com* is a new internet-based travel agency offering cheap flights to the Greek Islands. Market research has shown that the travel agency can expect to sell around 9 flights per hour through online sales.

Let T be the time between successive online sales with this agency. Find the probability that, in any one hour period, the time between two successive online sales is less than 10 minutes.