Learning outcomes: Chapter 6

1. In very general terms, you should know what is meant by the phrase *statistical inference.*

2. You should know that the sample mean $\bar{x}$ is an *estimator* of the (true) population mean μ, and that:

   – From a single sample, $x_1, x_2, \ldots, x_n$, $\bar{x} = \dfrac{1}{n} \sum_{i=1}^{n} x_i$ gives a *point estimate* of μ

   – $\bar{x}$ will vary from sample to sample

   – Sometimes $\bar{x}$ will over–estimate μ, sometimes it will under–estimate μ

3. You should know that the *Central Limit Theorem* tells us how $\bar{x}$ varies; specifically,

$$\bar{x} \sim N\left(\mu, \frac{\sigma^2}{n}\right),$$

   for large n, where σ^2 is the population variance.

4. As the sample size n increases, the *standard error* ($\sigma/\sqrt{n}$ – the standard deviation of $\bar{x}$) gets smaller, and so the *precision* of $\bar{x}$ increases.

5. You should be able to find 90%, 95% and 99% confidence intervals for the population mean μ when (1) the population variance is known, and (2) the population variance is unknown (see overleaf).

6. You should be able to perform simple hypothesis tests for one mean, when (1) the population variance is known, and (2) the population variance is unknown (see overleaf).

7. You should be able to perform simple hypothesis tests for two means, when (1) both population variances are known, and (2) both population variances are unknown.