Solutions to Exercises 5

1. We are told that the product fails if any of A, B or C fail. Therefore

   (a)

   $Pr(A, B, C$ all last for at least a year$)$
   $$= Pr(A \text{ lasts for at least a year AND } B \text{ lasts for at least a year AND } C \text{ lasts for at least a year})$$
   $$= Pr(A \text{ lasts for at least a year}) \times Pr(B \text{ lasts for at least a year}) \times Pr(C \text{ lasts for at least a year})$$

   assuming the components fail independently, and so

   $$Pr(A, B, C \text{ all last for at least a year}) = 0.98 \times 0.99 \times 0.95 = 0.92169.$$

   (b)

   $$Pr(\text{product is returned for a refund}) = 1 - Pr(\text{product is not returned for a refund})$$
   $$= 1 - Pr(A, B, C \text{ all last for at least a year})$$
   $$= 1 - 0.92169$$
   $$= 0.07831.$$

2. (a) There are 4 female students out of 18. So the probability that the student is female is
   $$\frac{4}{18} = 0.2222.$$

   (b) There are 6 students with weights greater than 70kg. So the probability that the student's weight is greater than 70kg. is
   $$\frac{6}{18} = 0.3333.$$

   (c) There are 4 students with weights greater than 70kg. and shoe-sizes greater than 8. So the probability of choosing such a student is
   $$\frac{4}{18} = 0.2222.$$

   (d) There are 8 students with weights greater than 70kg. or shoe-sizes greater than 8. So the probability of choosing such a student is
   $$\frac{8}{18} = 0.4444.$$