Statistics 3 Tutorial: Discrete Random Variables

Basic Mastery Questions

1. Two fair dice are thrown. Let X be the sum of the two results. By considering the 36 possible outcomes,
   (i) make a table of probability distribution.
   (ii) find $\mathrm{P}(X > 4)$.
   (iii) Calculate the mean of the random variable of X.
   Solution:
   (i)

$X = x$	2	3	4	5	6	7	8	9	10	11	12
$\mathrm{P}(X = x)$	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

   (ii) $P(X > 4) = P(X \geq 5) = \frac{30}{36} = \frac{5}{6}$

   (iii)
   $$E(X) = \sum xP(X = x)$$
   $$= \frac{2}{36} + \frac{6}{36} + \frac{12}{36} + \frac{20}{36} + \frac{30}{36} + \frac{42}{36} + \frac{40}{36} + \frac{36}{36} + \frac{30}{36} + \frac{22}{36} + \frac{12}{36}$$
   $$= 7$$

2. A bag contains eight blue discs and seven orange ones. Two discs are removed without replacement. Given that X is the number of orange discs taken out, draw up a probability distribution table, showing all the values of X together with the probability of each occurrence.
   Solution:

$X = x$	0	1	2
$\mathrm{P}(X = x)$	$\frac{8}{15}.\frac{7}{14} = \frac{56}{210}$	$2.\frac{8}{15}.\frac{7}{14} = \frac{112}{210}$	$\frac{7}{15}.\frac{6}{14} = \frac{42}{210}$