Tutorial Sheet 23
(Random Variables)

1. Check whether the following function can serve as the probability distribution of some random variable:

$$f(x) = \frac{x+5}{21} \qquad \text{for } x = 1, 2, 3.$$

2. State whether each of the following is a valid probability distribution of a random variable that can take on the values 1, 2, 3, 4, and 5. Explain your answer.

a)	p(1) = 0.5	p(2) = 0.2	p(3) = 0.15	p(4) = 0.1	p(5) = 0.05
b)	p(1) = 0.1	p(2) = 0.1	p(3) = 0.15	p(4) = 0.2	p(5) = 0.55
c)	p(1) = 0.2	p(2) = 0.1	p(3) = -0.15	p(4) = 0.45	p(5) = 0.4

3. A box contains 3 black balls and 5 white balls. A ball is drawn without replacement until a white ball is drawn. Let X be the number of draws required to draw a white ball.
   a) Write down the possible values of X.
   b) Find the probability distribution of X.

4. There are 4 black balls and 6 white balls in a bag. 5 balls are drawn randomly from the bag. Let X be the number of black balls drawn.

   a) Write down the possible values of X.
   b) Write down the number of different ways of choosing 5 balls from the bag.
   c) Find the number of different ways of choosing x black balls and (5 – x) white balls from the bag.
   d) Write down p(x) in terms of x, assuming that x is one of the values in (a).
   e) Write down the probability distribution of X.
   f) In general, if there are b black balls and w white balls in the bag and n balls are drawn, express p(x) in terms of b, w and n.