Tutorial Sheet 24
(Mathematical Expectation)

1. A discrete random variable can assume five possible values with the probability distribution shown below:

x	1	2	3	4	5
p(x) = P(X = x)	0.10	0.35	0.20	0.15	?

a) What is the missing value for p(5)?
b) Find the probability that x is more than 1.
c) Find the expected value and variance of the random variable.

2. The probability distribution for a discrete random variable X is given by the formula,

$$p(x) = (0.6)(0.4)^{x-1}, \quad x = 1, 2, 3, \ldots$$

Find E(X).

Hint: $1 + 2x + 3x^2 + 4x^3 + \ldots = \dfrac{1}{(1-x)^2}$, if $-1 < x < 1$.

3. The discrete random variable X has the following probability distribution.

x	1	2	3	4
P(X = x)	0.1	0.4	0.2	0.3

Find (i) E(X + 3)
(ii) E(2X – 5)

4. In a game, a player draws a card form an ordinary deck of 52 player cards. He is paid \$20 if he draws a Jack or Queen and \$40 if he draws a King or Ace. If he draws any other card, he loses \$n. Find n if the game is fair.

5. The probability distribution for a discrete random variable X is given by the formula,

$$f(x) = \frac{x+2}{20}, \qquad \text{for } x = 0, 1, 2, 3, 4.$$

Find E(X) and V(X).