EXERCISE ON EXPECTATION AND VARIANCE

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

x	-2	-1	0	1	2
$P(X = x)$	0.15	0.25	0.30	0.20	0.10

   (a) Calculate E(X) and V(X).
   (b) Find (i) E(3X + 5) (ii) V(X – 2) (iii) V(2X)

2. T and W are independent random variables such that E(T) = 2.5, E(W) = 3.6, V(T) = 0.7 and V(W) = 1.2.
   Calculate (i) E(3T – W) (ii) E(T + 0.5W) (iii) V(T – W) (iv) V(4T + 2W)

3. An unbiased cubical die is thrown once.
   (a) Find the expected value and the variance of the score on the uppermost face.
   (b) If four such dice are thrown, what is the expected value and variance of the total scores on the uppermost faces?

4. Joe is a used car salesman. The probability distribution of the number of cars (X) that he sells in any week is given below.

x	0	1	2	3	4	5
$P(X = x)$	0.09	0.38	0.26	0.15	0.10	0.02

(a) Calculate the expected number of cars that he sells in any given week and its variance.
(b) On top of his salary, Joe receives £30 commission for each car he sells. Calculate his expected commission for any given week and its variance.

5. Joanne works evenings delivering leaflets. Her pay depends on the number of leaflets that she delivers. Over a period of time, she has calculated that her expected pay in any week is £22 with standard deviation £3.
   (a) If she gets a pay rise of 8%, calculate the expected pay and standard deviation of her new pay.
   (b) If (instead of the 8% rise) her employer decides to pay her £5 per week in addition to her earnings, how would this effect her expected pay and standard deviation?