1 The hourly wages, £x, of a random sample of 60 employees working for a company are summarised as follows.

$$n = 60 \qquad \Sigma x = 759.00 \qquad \Sigma x^2 = 11\,736.59$$

 (i) Calculate the mean and standard deviation of x. **[3]**

 (ii) The workers are offered a wage increase of 2%. Use your answers to part **(i)** to deduce the new mean and standard deviation of the hourly wages after this increase. **[2]**

 (iii) As an alternative the workers are offered a wage increase of 25p per hour. Write down the new mean and standard deviation of the hourly wages after this 25p increase. **[2]**

2 A couple plan to have at least one child of each sex, after which they will have no more children. However, if they have four children of one sex, they will have no more children. You should assume that each child is equally likely to be of either sex, and that the sexes of the children are independent. The random variable X represents the total number of girls the couple have.

 (i) Show that $P(X = 1) = \frac{11}{16}$. **[3]**

The table shows the probability distribution of X.

r	0	1	2	3	4
$P(X = r)$	$\frac{1}{16}$	$\frac{11}{16}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$

 (ii) Find $E(X)$ and $Var(X)$. **[5]**

3 The numbers of eggs laid by a sample of 70 female herring gulls are shown in the table.

Number of eggs	1	2	3	4
Frequency	10	40	15	5

    (i) Find the mean and standard deviation of the number of eggs laid per gull. **[5]**

    (ii) The sample did not include female herring gulls that laid no eggs. How would the mean and standard deviation change if these gulls were included? **[2]**

4 The probability distribution of the random variable X is given by the formula

$$P(X = r) = kr(r + 1) \quad \text{for } r = 1, 2, 3, 4, 5.$$

    (i) Show that $k = \frac{1}{70}$. **[2]**

    (ii) Find $E(X)$ and $Var(X)$. **[5]**

5 The probability distribution of the random variable X is given by the formula

$$P(X = r) = kr(5 - r) \quad \text{for } r = 1, 2, 3, 4.$$

    (i) Show that $k = 0.05$. **[2]**

    (ii) Find $E(X)$ and $Var(X)$. **[5]**

6 A retail analyst records the numbers of loaves of bread of a particular type bought by a sample of shoppers in a supermarket.

Number of loaves	0	1	2	3	4	5
Frequency	37	23	11	3	0	1

   (i) Calculate the mean and standard deviation of the numbers of loaves bought per person.   **[5]**

  (ii) Each loaf costs £1.04. Calculate the mean and standard deviation of the amount spent on loaves per person.   **[3]**