1 The petrol consumption of a certain type of car has a normal distribution with mean 24 kilometres per litre and standard deviation 4.7 kilometres per litre. Find the probability that the petrol consumption of a randomly chosen car of this type is between 21.6 kilometres per litre and 28.7 kilometres per litre. [4]

2 Lengths of a certain type of white radish are normally distributed with mean $\mu$ cm and standard deviation $\sigma$ cm. 4% of these radishes are longer than 12 cm and 32% are longer than 9 cm. Find $\mu$ and $\sigma$. [5]

3 (i) State three conditions which must be satisfied for a situation to be modelled by a binomial distribution. [2]

George wants to invest some of his monthly salary. He invests a certain amount of this every month for 18 months. For each month there is a probability of 0.25 that he will buy shares in a large company, there is a probability of 0.15 that he will buy shares in a small company and there is a probability of 0.6 that he will invest in a savings account.

(ii) Find the probability that George will buy shares in a small company in at least 3 of these 18 months. [3]

4 A book club sends 6 paperback and 2 hardback books to Mrs Hunt. She chooses 4 of these books at random to take with her on holiday. The random variable $X$ represents the number of paperback books she chooses.

(i) Show that the probability that she chooses exactly 2 paperback books is $\frac{3}{14}$. [2]

(ii) Draw up the probability distribution table for $X$. [3]

(iii) You are given that $E(X) = 3$. Find $\text{Var}(X)$. [2]

5 Playground equipment consists of swings ($S$), roundabouts ($R$), climbing frames ($C$) and play-houses ($P$). The numbers of pieces of equipment in each of 3 playgrounds are as follows.

<table>
<thead>
<tr>
<th>Playground X</th>
<th>Playground Y</th>
<th>Playground Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>3$S$, 2$R$, 4$P$</td>
<td>6$S$, 3$R$, 1$C$, 2$P$</td>
<td>8$S$, 3$R$, 4$C$, 1$P$</td>
</tr>
</tbody>
</table>

Each day Nur takes her child to one of the playgrounds. The probability that she chooses playground $X$ is $\frac{1}{4}$. The probability that she chooses playground $Y$ is $\frac{1}{4}$. The probability that she chooses playground $Z$ is $\frac{1}{2}$. When she arrives at the playground, she chooses one piece of equipment at random.

(i) Find the probability that Nur chooses a play-house. [4]

(ii) Given that Nur chooses a climbing frame, find the probability that she chose playground $Y$. [4]
6 Find the number of different ways in which all 8 letters of the word TANZANIA can be arranged so that

(i) all the letters A are together, [2]
(ii) the first letter is a consonant (T, N, Z), the second letter is a vowel (A, I), the third letter is a consonant, the fourth letter is a vowel, and so on alternately. [3]

4 of the 8 letters of the word TANZANIA are selected. How many possible selections contain

(iii) exactly 1 N and 1 A, [2]
(iv) exactly 1 N? [3]

7 A typing test is taken by 111 people. The numbers of typing errors they make in the test are summarised in the table below.

<table>
<thead>
<tr>
<th>Number of typing errors</th>
<th>1 – 5</th>
<th>6 – 20</th>
<th>21 – 35</th>
<th>36 – 60</th>
<th>61 – 80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>24</td>
<td>9</td>
<td>21</td>
<td>15</td>
<td>42</td>
</tr>
</tbody>
</table>

(i) Draw a histogram on graph paper to represent this information. [5]

(ii) Calculate an estimate of the mean number of typing errors for these 111 people. [3]

(iii) State which class contains the lower quartile and which class contains the upper quartile. Hence find the least possible value of the interquartile range. [3]