1) Consider the following data:

17 62 15 65
28 51 24 65
39 41 35 15
39 32 36 37
40 21 44 37
59 13 44 56
12 54 64 59

a) Construct a frequency distribution.

b) Draw a histogram (frequency distribution graph).

2) Ten economists were asked to predict the percentage growth in the Consumer Price Index over the next year. Their forecasts were

3.6 3.1 3.9 3.7 3.5
3.7 3.4 3.0 3.7 3.4

Compute the sample mean, median and the mode.

3) The demand for bottled water increases during the hurricane season in Florida. A random sample of 7 hours showed that the following numbers of 1-gallon bottles were sold in one store:

40 55 62 43 50 60 65

a) Describe the central tendency measures of the data.

b) Comment on symmetry or skewness.

4) The time (in seconds) that a random sample of employees took to complete a task is

23 35 14 37 28 45
12 40 27 13 26 25
37 20 29 49 40 13
27 16 40 20 13 66

a) Find the mean.

b) Find the variance and the standard deviation.
1) Since the number of observations are less than 50, the number of intervals must be chosen as 5 or 6.

If the number of intervals is chosen as 6 $\Rightarrow$ 
\[ \text{width} = \frac{(65 - 12)}{6} \approx 9 \]

<table>
<thead>
<tr>
<th>Intervals</th>
<th># of Observations</th>
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<tbody>
<tr>
<td>12-21</td>
<td>6</td>
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<td>22-31</td>
<td>2</td>
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<td>32-41</td>
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<td>42-51</td>
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<td>52-61</td>
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<td>62-71</td>
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</tbody>
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and the corresponding histogram is

If the number of intervals is chosen as 5 $\Rightarrow$ 
\[ \text{width} = \frac{(65 - 12)}{5} \approx 10 \]

<table>
<thead>
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<tbody>
<tr>
<td>12-22</td>
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<td>23-33</td>
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<td>34-44</td>
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<td>45-55</td>
<td>3</td>
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<td>56-66</td>
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and the corresponding histogram is
2) \( \bar{X} = \frac{\sum x_i}{n} = \text{Sample Mean} = \frac{35}{10} = 3.5, \text{ Median} = \frac{3.5 + 3.6}{2} = 3.55, \text{ Mode} = 3.7 \)

3) a) \( \bar{X} = \frac{\sum x_i}{n} = \text{Sample Mean} = \frac{375}{7} = 53.57, \text{ Median} = 55. \) No unique mode exists in the distribution.

b) Since the mean is slightly less than the median, the distribution is slightly negatively skewed or very close to symmetric distribution.

4) a) \( \bar{X} = \frac{\sum x_i}{n} = \text{Sample Mean} = \frac{695.04}{24} = 28.96 \)

b) \( s^2 = \frac{\sum (X_i - \bar{X})^2}{n-1} = \text{Variance} = \frac{(23-28.96)^2 + (35-28.96)^2 + (14-28.96)^2 + \ldots + (66-28.96)^2}{23} = 184.13 \)

\( \text{Standard Deviation} = \sqrt{\text{Variance}} = \sqrt{184.13} = 13.57 \)
1) It is known that amounts of money spent on textbooks in a year by students on a particular campus follow a normal distribution with a mean $380 and standard deviation $50.
   a) What is probability that a randomly chosen student will spend less than $400 on textbooks in a year?
   b) What is the probability that a randomly chosen student will spend more than $360 on textbooks in a year?
   c) What is the probability that a randomly chosen student will spend between $300 and $400 on textbooks in a year?

2) An investment portfolio contains stocks of a large number of corporations. Over the last year the rates of return on these corporate stocks followed a normal distribution with a mean of 12.2 % and standard deviation of 7.2%.
   a) For what proportion of these corporations was the rate of return higher than 20%?
   b) For what proportion of these corporations was the rate of return negative?
   c) For what proportion of these corporations was the rate of return between 5% and 15%?

3) Scores on an examination taken by a large group of students are normally distributed with mean 700 and standard deviation 120.
   a) An A is awarded for a score higher than 820. What proportion of all students obtain an A?
   b) A B is rewarded for scores between 730 and 820. An instructor has a section of 100 students who can be viewed as a random sample of all students in the large group. Find the expected number of students in this section who will obtain a B?
   c) It is decided to give a failing grade to 5% of students with the lowest scores. What is the minimum score needed to avoid a failing grade?

4) A new television series is to be shown. A broadcasting executive feels that his uncertainty about the rating which the show will receive in its first month can be represented by a normal distribution with mean 18.2 and standard deviation 1.6. According to this executive, the probability is 0.1 that the rating will be less than what number?

5) A company services copiers. A review of its records shows that the time taken for a service call can be represented by a normal distribution with mean 75 minutes and standard deviation 20 minutes.
   a) What proportion of service calls takes less than 1 hour?
   b) What proportion of service calls takes more than 90 minutes?
   c) The probability is 0.1 that a service call takes more than how many minutes?
1) a) \( P(Z < \frac{400 - 380}{50}) = P(Z < 0.4) = 0.6554 \)
   b) \( P(Z > \frac{360 - 380}{50}) = P(Z > -0.4) = 0.6554 \)
   c) \( P\left(\frac{300 - 380}{50} < Z < \frac{400 - 380}{50}\right) = P(-1.6 < Z < 0.4) = 0.6554 - 0.0548 = 0.600 \)

2) a) \( P(Z > \frac{20 - 12.2}{7.2}) = P(Z > 1.08) = 0.140 \)
   b) \( P(Z < \frac{0 - 12.2}{7.2}) = P(Z < -1.69) = 0.045 \)
   c) \( P\left(\frac{5 - 12.2}{7.2} < Z < \frac{15 - 12.2}{7.2}\right) = P(-1 < Z < 0.39) = 0.6517 - 0.1587 = 0.4930 \)

3) a) \( P(Z > \frac{820 - 720}{120}) = P(Z > 1) = 0.1587 \)
   b) \( P\left(\frac{730 - 700}{120} < Z < \frac{820 - 700}{120}\right) = P(0.25 < Z < 1) = 0.8413 - 0.5987 = 0.2426 \)

   Number of students = 0.2426*100 = 24.26 or 24 students

   c) \( P(Z < -1.645) = 0.05, \quad -1.645 = \frac{X - 700}{120}, \quad X = 502.6 \)

4) \( P(Z < -1.28) = 0.1, \quad -1.28 = \frac{X - 18.2}{1.6}, \quad X = 16.152 \)

5) a) \( P(Z < \frac{60 - 75}{20}) = P(Z < -0.75) = 0.2266 \)
   b) \( P(Z > \frac{90 - 75}{20}) = P(Z > 0.75) = 0.2266 \)
   c) \( P(Z > 1.28) = 0.1, \quad 1.28 = \frac{X - 75}{20}, \quad X = 100.6 \)