1. A sample of 400 manufacturer's representatives were audited by a tax department as part of a study of business mileage deductions. The mileage deductions of these 400 representatives are summarized in the following table:

<table>
<thead>
<tr>
<th>Mileage</th>
<th>Frequency</th>
<th>Cumulative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - under</td>
<td>10,000</td>
<td>20</td>
</tr>
<tr>
<td>10,000 - under</td>
<td>20,000</td>
<td>40</td>
</tr>
<tr>
<td>20,000 - under</td>
<td>30,000</td>
<td>100</td>
</tr>
<tr>
<td>30,000 - under</td>
<td>40,000</td>
<td>140</td>
</tr>
<tr>
<td>40,000 - under</td>
<td>50,000</td>
<td>60</td>
</tr>
<tr>
<td>50,000 - under</td>
<td>60,000</td>
<td>40</td>
</tr>
</tbody>
</table>

(a) Plot the ogive in the following chart.

(b) Using the ogive in part (a), find the approximate median number of miles deducted by these 400 representatives.

(c) In the following sentence supply the missing value:

Ninety five percent of these representatives claimed mileage deductions of approximately _________ or less.

(d) Using the ogive in part (a), find the approximate lower quartile $Q_1$ of the number of miles deducted by these 400 representatives.
What is the modal class of this frequency distribution?

Modal Class:

2. Euromomitor Publications Limited compiles data on per capita food consumption of major food commodities in various countries. Samples of 10 Germans and 15 Russians yield the following boxplots for fish consumption in kilograms for last year.

Box Plots for Fish Consumption

<table>
<thead>
<tr>
<th>Nationality</th>
<th>German 1</th>
<th>German 2</th>
<th>Russian 1</th>
<th>Russian 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Consumption (Kg)</td>
<td>15</td>
<td>20</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

(a) Which of the two nationalities is displaying more variation? Explain.

The Russians display (circle one) **more** / same / **less** variation than the Germans.

Explain:

(b) In looking at the boxplot for the Russians, comment on the symmetry of the data. That is, is the data symmetric or skewed (left/right)? Explain.

Circle one: symmetric / skewed to the left / skewed to the right

Explain:

3. A team of medical researchers have developed an exercise program to help reduce hypertension. To ascertain whether the program is effective, the team selects a sample of 10 hypertensive individuals and places them on the exercise program for 1 month. The following table displays the diastolic blood pressures of the 10 hypertensive individuals before they began the exercise program:

<table>
<thead>
<tr>
<th>Before Exercise</th>
<th>106</th>
<th>118</th>
<th>118</th>
<th>99</th>
<th>109</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>94</td>
<td>109</td>
<td>95</td>
<td>97</td>
<td>106</td>
</tr>
</tbody>
</table>
(a) Use the data in the sample to estimate the mean diastolic blood pressure for hypertensive individuals. Show workings.

Mean :

(b) Estimate the sample standard deviation (SD). Show workings and round answer to two decimal places.

SD :

(c) Give the standardized version of \( x \), where \( x \) denotes diastolic blood pressure.

\[ Z = \]

(d) Using your answer in part (c), determine the z-score for a diastolic blood pressure of 90. (Round answer to two decimal places.)

Answer :

(e) Interpret the z-score in part (d)

Interpretation: ____________________________

4. An investment firm has classified its 200 clients according to their gender and the composition of their investment portfolio (bonds, stocks, or a balanced mix of bonds and stocks). The frequencies of clients falling into the various categories are shown in the following table:

<table>
<thead>
<tr>
<th>Gender</th>
<th>Portfolio Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bonds</td>
</tr>
<tr>
<td>Male</td>
<td>20</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
</tr>
</tbody>
</table>

One client is selected at random and two events are defined as follows:
A: The client selected is male
B: The client selected has a balanced portfolio.

(a) Find the probability that the selected client is male.

Probability :

(b) Express in words the event \( A \cap B \).
(c) Are A and B mutually exclusive events? Explain. 

Circle One: Yes / No

Explain: ________________________________________________________________

(d) Find the probability of $A \cup B$.

Probability: ______________________________________________________________

(e) Find the probability of $A | B$.

Probability: ______________________________________________________________

(f) Are A and B independent events? Explain.

The events A and B (circle one) are / are not independent events.

Because: ________________________________________________________________

(g) Find the probability of $\bar{A}$

Probability: ______________________________________________________________

FORMULAE

The following formulae may be useful:

\[
\bar{x} = \frac{\sum x_i}{n}
\]

\[
\mu = \frac{\sum x_i}{N}
\]

\[
\sigma^2 = \frac{\sum (x_i - \mu)^2}{N}
\]

\[
s^2 = \frac{\sum (x_i - \bar{x})^2}{n - 1}
\]

\[
\sigma^2 = \frac{\sum x_i^2}{N} - \mu^2
\]

\[
s^2 = \frac{\sum x_i - (\sum x_i)^2}{n - 1}
\]

\[
Z = \frac{X - \mu}{\sigma}
\]

\[
P(A) + P(\bar{A}) = 1
\]

\[
P(A | B) = \frac{P(A \cap B)}{P(B)}
\]

\[
P(A \cap B) = P(B) \times P(A | B)
\]

\[
P(A \cup B) = P(A) + P(B) - P(A \cap B)
\]

\[
P(A | B) = P(A)
\]