MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The veterinary bills for the dogs are summarized in the ogive below. Estimate the IQR of these expenses.

- A) $100
- B) $75
- C) $200
- D) $150
- E) $50

2) Last weekend police ticketed 18 men whose mean speed was 72 miles per hour, and 30 women going an average of 64 mph. Overall, what was the mean speed of all the people ticketed?
   - A) none of these
   - B) It cannot be determined.
   - C) 68 mph
   - D) 69 mph
   - E) 67 mph

3) Which is true of the data shown in the histogram?
   I. The distribution is skewed to the right.
   II. The mean is probably smaller than the median.
   III. We should use median and IQR to summarize these data.
   - A) II only
   - B) III only
   - C) I only
   - D) II and III only
   - E) I, II, and III

4) If we want to discuss any gaps and clusters in a data set, which of the following should not be chosen to display the data set?
   - A) dotplot
   - B) histogram
   - C) stem-and-leaf plot
   - D) boxplot
   - E) any of these would work
5) The best estimate of the standard deviation of the men's weights displayed in this dotplot is

A) 40  B) 15  C) 25  D) 35  E) 10

6) The advantage of making a stem-and-leaf display instead of a dotplot is that a stem-and-leaf display
   A) none of these
   B) preserves the individual data values.
   C) A stem-and-leaf display is for quantitative data, while a dotplot shows categorical data.
   D) shows the shape of the distribution better than a dotplot.
   E) satisfies the area principle.

7) The five-number summary of credit hours for 24 students in a statistics class is:

<table>
<thead>
<tr>
<th>Min</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0</td>
<td>15.0</td>
<td>16.5</td>
<td>18.0</td>
<td>22.0</td>
</tr>
</tbody>
</table>

From this information we know that
   A) there is at least one high outlier in the data.
   B) none of these
   C) there is at least one low outlier in the data.
   D) there are no outliers in the data.
   E) there are both low and high outliers in the data.

8) Which of the following data summaries are changed by adding a constant to each data value?
   I. the mean
   II. the median
   III. the standard deviation
   A) I and III  B) I, II, and III  C) I only  D) III only  E) I and II
9) **Paying for purchases** One day a store tracked the way shoppers paid for their purchases. Their data are summarized in the table.

<table>
<thead>
<tr>
<th></th>
<th>Cash</th>
<th>Check</th>
<th>Charge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18</td>
<td>10</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>12</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>22</td>
<td>42</td>
<td>100</td>
</tr>
</tbody>
</table>

a. What is the marginal relative frequency distribution of payment method?

b. What is the conditional relative frequency distribution of payment method for women?

c. If you wanted to show the association between gender and method of payment visually, what kind of graph would you make? (Just name it.)


10) **House calls** A local plumber makes house calls. She charges $30 to come out to the house and $40 per hour for her services. For example, a 4-hour service call costs $30 + $40(4) = $190.

a. The table shows summary statistics for the past month. Fill in the table to find out the cost of the service calls.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Hours of Service Call</th>
<th>Cost of Service Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>IQR</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

b. This past month, the time the plumber spent on one service call corresponded to a z-score of -1.50. What was the z-score for the cost of that service call?
11) **Veterinary costs** Costs for standard veterinary services at a local animal hospital follow a Normal model with a mean of $80 and a standard deviation of $20.

a. Draw and clearly label this model.

![Normal Distribution Graph]

b. Is it unusual to have a veterinary bill for $125? Explain.

c. What is the IQR for the costs of standard veterinary services? Show your work.

12) **Soda pop** A machine that fills cans with soda fills according to a Normal model with mean 12.1 ounces and standard deviation 0.05 ounces.

a. If the cans claim to have 12 ounces of soda each, what percent of cans are under-filled?

b. Management wants to ensure that only 1% of cans are under-filled.
   i. Scenario 1: If the mean fill of the cans remains at 12.1 ounces, what standard deviation does the filling machine need to have to achieve this goal?

   ii. Scenario 2: If the standard deviation is to remain at 0.05 ounces, what mean does the filling machine need to have to achieve this goal?