This is not a sample test. If you know how to do all the problems in this, you will be ready for the test. The actual test is written for 50 minutes.

1. Use the following stem display of 1995 P/E forecast of 28 American companies to answer the questions.

   16 | 8
   15 | 4
   14 | 0 6 7 8 9
   13 | 5 6 8 8
   12 | 0 8
   11 | 3 3 5 7
   10 | 4
   9 | 1 4 5 8 8
   8 | 0 0 1
   7 |
   6 |
   5 | 2
   4 | 7
   n = 28
   Stem unit = 1.0
   Leaf unit = 0.1

   (a) List the smallest and the largest.
   (b) Find the mean of the data.
   (c) Find the mode/s of the data.
   (d) Find the median of the data.
   (e) Which measure (mean, median or both) better represents the center of data? Explain why?

2. If somebody invests $2,000 at 5%, $3,000 at 6.3%, and $20,000 at 7%, what is the overall percentage yield of these investments?

3. During a special promotion, a discount chain sold 200, 235, and 300 TV sets in three of its stores at average prices $250, $235 and $220, respectively. What is the mean price of the TV sets sold?

4. Assume the following data in thousands of dollars is the annual salaries of 40 employees of a small company in 1990. Construct a frequency table using the following data and the classes given in the table.

   | 23  | 24  | 18  | 14  | 20  | 25  | 26  | 29  | 31  | 37  |
---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
23  | 33  | 16  | 23  | 11  | 16  | 22  | 26  | 31  | 35  | 22  |
36  | 36  | 55  | 37  | 33  | 23  | 28  | 44  | 36  | 41  | 48  |
<table>
<thead>
<tr>
<th>Class</th>
<th>Tally</th>
<th>Frequency</th>
<th>Relative Freq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Find the class limits, class marks, class boundaries, and class interval using the data from problem 4.

6. Draw a histogram and a frequency polygon on the same graph using the data from problem 4.

7. Construct a relative (percentage) frequency distribution using the data from problem 4.

8. Assume that a sample of 25 workers in Pittsburgh provided the following information about their hourly wages:
   11.50, 8.40, 11.75, 10.05, 10.25, 8.00, 13.65, 7.05, 9.05, 11.90, 9.90, 6.85, 15.35, 11.10, 14.70, 13.15, 13.10, 6.65, 13.10, 9.20, 9.15, 12.05, 8.45, 5.85, 9.80

   Find the five number summary and draw a box plot. Are there any outliers?

9. Find (a) the range, (b) the standard deviation and (c) the variance of the following average hourly wages in 5 local grocery stores:
   6.25, 6.75, 6.00, 8.50, 7.50

10. Explain the empirical rule.

11. A stock A has an average value of $63.45 with a standard deviation of $8.18 during the last four weeks. Another stock, stock B has an average value of $24.23 with a standard deviation of $4.09 during the same period. Which stock has a more consistent price?

12. Former NBA superstar Michael Jordan is 78 in. tall, and WNBA basketball player Rebecca Lobo is 76 in. tall. Jordan is obviously taller by 2 in., but which player is relatively taller? Men have heights with a mean of 69.0 in. and a standard deviation of 2.8 in.; women have heights with a mean of 63.6 in. and a standard deviation of 2.5 in (based on data from the National Health Survey).

13. A travel brochure lists 12 museums in the city of London. In how many ways can a tourist visit four museums
   (a) if the order in which the museums are visited does not matter;
   (b) if the order in which the museums are visited does matter?

14. What is the probability of rolling a total of 7 with two fair 4-sided dice?
15. Give an example for each of the following types of data. (Nominal, ordinal, interval, and ratio)

16. Define a population and a sample.

17. An importer is offered a shipment of pineapples for $10000, and the probabilities that he will be able to sell them for $15000, $12000, or $8000 are 0.34, 0.36, and 0.30. What is the importer’s expected profit?

18. Explain the following:
   (a) Measures of location.
   (b) Measures of variation.
   (c) Measure of relative variance.

19. Classify the following measures into the given groups.
   (1) Mean, (2) Range, (3) Variance, (4) Coefficient of Variation, (5) Median, (6) Any measure which explains the center of data, and (7) Any measure which explains the spread of the data.

<table>
<thead>
<tr>
<th>Measure of Location</th>
<th>Measure of Variation</th>
<th>Measure of Relative Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20. In how many different ways can one select 4 cards out of an ordinary pack of 52 without order?

21. In how many different ways can one select 4 people out of 100 with order?

22. If you roll two six-sided balanced dice, what is the probability that the sum of the two numbers is 7? Note there are 36 equally likely possibilities.

23. Classify the following variables to one of the four data types.
   Weight, blood type, temperature, calendar year

24. Match the following symbols with the definitions.

   \[ \mu \quad s \quad \bar{X} \quad s^2 \quad \bar{X} \quad \sigma \quad Q_i \quad \bar{X} \]

   (a) Sample mean  (g) Weighted mean
   (b) Sample variance  (h) Summation notation
   (c) Population mean  (i) Sample standard deviation
   (d) Population variance  (j) Population standard deviation
   (e) Median  (k) First quartile
   (f) Grand mean  (l) Other
Find the following using the above EXCEL output.

(a) \( \bar{x} \)
(b) \( s \)
(c) \( \sum x_i \)
(d) \( n \)
(e) \( \hat{x} \)
(f) Minimum

26 Draw a dot plot for the following data.

0 0 0 1 2 1 0 1 2 0 1
1 0 2 0 0 1 1 2 3 1 2

27 Draw a Pareto plot for the color of the car using the following data.

<table>
<thead>
<tr>
<th>Customer Number</th>
<th>Color of the Car</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White</td>
</tr>
<tr>
<td>2</td>
<td>Blue</td>
</tr>
<tr>
<td>3</td>
<td>Red</td>
</tr>
<tr>
<td>4</td>
<td>White</td>
</tr>
<tr>
<td>5</td>
<td>White</td>
</tr>
<tr>
<td>6</td>
<td>Black</td>
</tr>
<tr>
<td>7</td>
<td>Blue</td>
</tr>
<tr>
<td>8</td>
<td>Black</td>
</tr>
<tr>
<td>9</td>
<td>Green</td>
</tr>
<tr>
<td>10</td>
<td>Black</td>
</tr>
</tbody>
</table>
28. (a) What are the five number summary in the following MINITAB output?

(b) What is the sample mean?
(c) What is the sample standard deviation?
(d) Calculate is the range?
(e) Calculate the sample variance.

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SE Mean</th>
<th>StDev</th>
<th>Minimum</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>14</td>
<td>71.79</td>
<td>5.89</td>
<td>22.03</td>
<td>12.00</td>
<td>67.25</td>
<td>78.50</td>
<td>84.50</td>
<td>95.00</td>
</tr>
</tbody>
</table>

29. Make a few comments about the following box plot.

![Boxplot of Grades](image)

30. Which variable has higher variability? Test 1 grade or Final grade?

![Dotplot of Test1 grades, Final grades](image)

31. Compare the variance of the two variables using range and standard deviation using the following MINITAB output.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SE Mean</th>
<th>StDev</th>
<th>Minimum</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test1 grades</td>
<td>18</td>
<td>79.89</td>
<td>4.08</td>
<td>17.32</td>
<td>25.00</td>
<td>77.25</td>
<td>84.50</td>
<td>89.25</td>
<td>99.00</td>
</tr>
<tr>
<td>Final grades</td>
<td>18</td>
<td>83.39</td>
<td>1.98</td>
<td>8.42</td>
<td>68.00</td>
<td>77.75</td>
<td>80.50</td>
<td>91.50</td>
<td>99.00</td>
</tr>
</tbody>
</table>