1. A distributor of appliances is doing a customer satisfaction survey for a manufacturer of DVD players. A sample of 68 clients is asked to rate a particular DVD player on appearance, functionality, ease of use, and price on a 1 to 10 scale, where 1 corresponds to the worst rating and 10 to the best possible rating. A bar graph of the ease of use ratings classified by gender is given below.

What percentage of the sampled female clients rated the DVD player as not so easy to use (a rating of 4 or lower)?
(1) 28%  (2) 29%  (3) 38%  (4) 62%
Use the following to answer questions 2 and 3:

The histogram below represents the height (in inches) of the gold medal–winning high jumps for the Olympic Games up to Sydney 2000.

2. What is approximately the mean height?
   (1) 75 inches  (2) 77.5 inches  (3) 82 inches  (4) 90 inches

3. What is approximately the percentage of these winning jumps that were at least 7'1” high (85 inches)?
   (1) 9%  (2) 14%  (3) 23%  (4) 35%
A consumer agency is testing appliances for a series of articles in their magazine. Currently they are working with cook tops and ranges. They have selected 16 of the most commonly used models. Using a series of tests, the agency will estimate the lifetime of these models. A histogram of these (estimated) lifetimes is shown below.

4. What is the proportion of these appliances that is estimated to last longer than 15 years?
   (1) More than half.          (3) Equal to $4/16 = 0.25$.
   (2) Less than half.          (4) Unable to determine from this graph.

5. Select a correct description for the shape of the histogram of the estimated lifetimes of these 16 appliances.
   (1) Symmetric
   (2) Bimodal
   (3) Skewed right
   (4) Skewed left
Use the following to answer questions 6 and 7:

During the early part of the 1994 baseball season, many sports fans and baseball players noticed that the number of home runs being hit seemed to be unusually large. Below are separate stemplots for the number of home runs by American League and National League teams based on the team-by-team statistics on home runs hit through Friday, June 3, 1994 (from the *Columbus Dispatch* sports section, Sunday, June 5, 1994).

<table>
<thead>
<tr>
<th>American League</th>
<th>National League</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 5</td>
<td>3 9</td>
</tr>
<tr>
<td>4 0 3 9</td>
<td>4 2 6 7 8 8</td>
</tr>
<tr>
<td>5 1 4 7 8 8</td>
<td>5 3 5 5 5</td>
</tr>
<tr>
<td>6 4 8 8</td>
<td>6 3 3 7</td>
</tr>
<tr>
<td>7 5 7</td>
<td>7</td>
</tr>
</tbody>
</table>

6. What is the median for the number of home runs for the American League teams?
   (1) 45 (2) 50 (3) 50.5 (4) 57.5

7. Determine which of the following statements is true.
   (1) The American League plot is reasonably symmetric.
   (2) The National League plot is bimodal.
   (3) The median number of home runs hit by National League teams for this time period was higher than the median for the American League teams.
   (4) The lowest number of home runs by the American League teams is 20.

8. A consumer group surveyed the prices for white cotton extra-long twin sheet sets in five different department stores and reported the average price as $16. We visited four of the five stores, and found the prices to be $12, $15, $17, and $22. Assuming that the consumer group is correct, what is the price of the item at the store that we did not visit?
   (1) $10 (2) $14 (3) $15 (4) $17

9. The average salary of all female workers is $35,000. The average salary of all male workers is $41,000. What must be true about the average salary of all workers?
   (1) It must be $38,000.
   (2) It must be larger than the median salary.
   (3) It is greater than or equal to $35,000, and less than or equal to $41,000.
   (4) It must be larger than $38,000.
10. The mean age of five people in a room is 30 years. One of the people whose age is 50 years leaves the room. What is the mean age of the remaining four people in the room?
(1) 40 years
(2) 30 years
(3) 25 years
(4) This cannot be determined from the information given.

11. The median age of five people in a meeting is 30 years. One of the people, whose age is 50 years, leaves the room. What is the median age of the remaining four people in the room?
(1) 40 years.
(2) 30 years.
(3) 25 years.
(4) This cannot be determined from the information given.

Use the following to answer questions 12 and 13:

In a statistics class with 136 students, the professor records how much money each student has in their possession during the first class of the semester. The histogram shown below represents the data he collected.

![Histogram](image)

12. From the histogram, which of the following is true?
(1) The mean is larger than the median.
(2) The mean is smaller than the median.
(3) The mean and median are approximately equal.
(4) It is impossible to compare the mean and median for these data.

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13. What is the range of the data set?
   (1) 90    (2) 100    (3) 110    (4) This cannot be determined from just the histogram.

Use the following to answer questions 14 and 15:

The Michigan Department of Transportation (M-DOT) is working on a major project: 80% of the highways in Michigan need to be repaved. To speed completion of this project, many contractors will be working for M-DOT. Contractors are currently bidding on the next part of the project. To help make a decision about which contractor to hire, M-DOT collects many variables besides just the estimated cost. One of those variables is the contractor's estimate of the number of work days required to finish the job. Twenty contractors have bid on the next job. The boxplot below represents their estimates of the number of work days required.

14. What is (approximately) the interquartile range, based on the boxplot?
   (1) 140 days    (2) 270 days    (3) 360 days    (4) 760 days

15. Determine which of the following statements is true .
   (1) The median number of days is approximately 160.
   (2) The average number of days is approximately 160.
   (3) The maximum number of days is approximately 750.
   (4) Twenty-five percent of contractors estimated the number of days to be more than 100.
Use the following to answer questions 16 and 17

The following boxplot is of the birth weights (in ounces) of a sample of 160 infants born in a local hospital.

16. Fill in the blank. About 40 of the birth weights were below _______________
   (1) 92 ounces. (2) 102 ounces. (3) 112 ounces. (4) 122 ounces.

17. Fill in the blank. Approximately ______________ children had birth weights between 102 and 122 ounces.
   (1) 40 (2) 50 (3) 80 (4) 100

18. This is a standard deviation contest. Which of the following sets of four numbers has the largest possible standard deviation?
   (1) 7, 8, 9, 10 (2) 5, 5, 5, 5 (3) 0, 0, 10, 10 (4) 0, 1, 2, 3

19. A sample of 16 people is taken and their weights are measured. The standard deviation of these 16 measurements is computed to be 5.4. What is the variance of these measurements?
   (1) 2.24 lbs. (2) 2.24 lbs². (3) 29.16 lbs. (4) 29.16 lbs².

20. A group of children in a room has an average age 4. If another 4-year-old child enters the room, what will happen to the mean and variance?
   (1) The mean will stay the same but the variance will increase.
   (2) The mean will stay the same but the variance will decrease.
   (3) The mean and variance will both stay the same.
   (4) The mean and variance will both decrease.
Use the following to answer questions 21 and 22:

21. For this density curve, what percent of the observations lie above 1.5?  
   (1) 25%   (2) 50%   (3) 75%   (4) 80%

22. For this density curve, what percent of the observations lie between 0.5 and 1.2?  
   (1) 25%   (2) 35%   (3) 50%   (4) 70%

23. For the density curve below, which of the following is true?  
   (1) The mean and median are equal.  
   (2) The mean is greater than the median.  
   (3) The mean is less than the median.  
   (4) The mean could be either greater than or less than the median.
24. For the density curve displayed below, the IQR is

(1) equal to 0.75-0.25=0.5 (2) greater than 0.5 (3) less than 0.5

Use the following to answer questions 25 and 26:

Many residents of suburban neighborhoods own more than one car but consider one of their cars to be the main family vehicle. The age of these family vehicles can be modeled by a normal distribution with mean 2 years and standard deviation 6 months.

25. What percentage of family vehicles is between 1 and 3 years old?
   (1) Cannot be determined based on the information given. (2) 68%  (3) 95%  (4) 99.7%

26. What is the standardized value for a family vehicle that is 3 years and 3 months old?
   (1) 0.22  (2) 2.5  (3) 2.6  (4) 2.92

27. The variable Z has a standard normal distribution. Find the value z such that 85% of the observations fall above z.
   A) $z = -1.04$  B) $z = -0.85$  C) $z = 0.85$  D) $z = 1.04$

28. The scores on a university examination are normally distributed with a mean of 62 and a standard deviation of 11. If the bottom 5% of students will fail the course, what is the lowest mark that a student can have and still be awarded a passing grade?
   (1) 62  (2) 57  (3) 44  (4) 40

29. A soft-drink machine can be regulated so that it discharges an average of $\mu$ ounces per cup. If the ounces of fill are normally distributed with a standard deviation of 0.4 oz, what value should $\mu$ be set at so that 98% of the time 6-oz. cups will NOT overflow?
   (1) 5.18  (2) 5.60  (3) 6.00  (4) 6.82
30. The weights of packets of cookies produced by a certain manufacturer have a normal distribution with a mean of 202 g. and a standard deviation of 3 g. What is the (approximate) IQR?
   (1) 6 g.  (2) 4 g.  (3) 20 g.  (4) Not enough information to determine.

31. The graph below plots the fuel efficiency (in miles per gallon, or MPG) of various cars versus the weight of these cars (in thousands of pounds).

The points denoted by the symbol × correspond to pick-up trucks and SUVs. The points denoted by the dots correspond to automobiles (sedans and station wagons). What can we conclude from this plot?
   (1) There is little difference between trucks and automobiles.
   (2) Trucks tend to be heavier and get poorer gas mileage than automobiles.
   (3) The plot is invalid. A scatterplot is used to represent quantitative variables, and the vehicle type is a qualitative variable.
32. A student wonders if people of similar heights tend to date each other. She measures herself, her dormitory roommate, and the women in the adjoining rooms; then she measures the next man whom each woman dates. Here are the data (heights in inches):

<table>
<thead>
<tr>
<th>Women</th>
<th>64</th>
<th>65</th>
<th>65</th>
<th>66</th>
<th>66</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>68</td>
<td>68</td>
<td>69</td>
<td>70</td>
<td>72</td>
<td>74</td>
</tr>
</tbody>
</table>

Determine which of the following statements is true.
(1) If we had measured the heights of the men and women in centimeters (1 inch ≈ 2.5 cm), the correlation coefficient would have been 2.5 times larger.
(2) There is a strong negative association between the heights of men and women because the women are always smaller than the men they date.
(3) There is a positive association between the heights of men and women.
(4) Any height above 70 inches must be considered an outlier.
33. Match the 3 graphs labeled A, B and C, with the following 3 possible values of the correlation coefficient: –0.7, 0.4, 0.95 in a correct order. Assume all 3 graphs are made on the same scale.

A) 

B) 

C) 

(1) (–0.7, 0.4, 0.95); (2) (–0.7, 0.95, 0.4); (3) (0.4, 0.95, --0.7)