Fall 2015 AP Statistics Final Review

Multiple Choice
Identify the choice that best completes the statement or answers the question.

_____ 1. The following bar graph gives the percent of owners of three brands of trucks who are satisfied with their truck. From this graph, we may conclude that

![Bar Graph]

- a. owners of other brands of trucks are less satisfied than the owners of these three brands.
- b. Chevrolet owners are much more satisfied than Ford or Toyota owners.
- c. There are only small differences in the satisfaction of owners for the three brands.
- d. Chevrolet probably sells more trucks than Ford or Toyota.
- e. A pie chart would have been a better choice for displaying these data.

_____ 2. Here are the IQ test scores of 10 randomly chosen fifth-grade students:

145 139 126 122 125 130 96 110 118 118

To make a stemplot of these scores, you would use as stems

- a. 0 and 1
- b. 09, 10, 11, 12, 13, and 14
- c. 96, 110, 118, 122, 125, 126, 130, 139, and 145.
- d. 0, 2, 3, 5, 6, 8, 9.
- e. None of the above is a correct answer.
3. If a distribution is skewed to the right, which of the following is true?
   a. The mean must be less than the median.
   b. The mean and median must be equal.
   c. The mean must be greater than the median.
   d. The mean is either equal to or less than the median.
   e. It’s impossible to tell which of the above statements is true without seeing the data.

4. A sample of 250 high school students were asked, “If you had $1000 to contribute to one kind of charitable organization, which type of organization would you choose?” Below is a two-way table of responses to this question and gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Education</th>
<th>Environment</th>
<th>Health</th>
<th>International Aid</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>19</td>
<td>33</td>
<td>50</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>Male</td>
<td>23</td>
<td>29</td>
<td>28</td>
<td>17</td>
<td>13</td>
</tr>
</tbody>
</table>

Which of the following conclusions seems to be supported by the data?
   a. Most of the females who chose a health organization would have chosen an environmental organization as their second choice, had they been asked.
   b. There is no association between gender and choice of organization.
   c. The proportion of males who said they would contribute to an environmental organization was higher than the proportion of females who said they would contribute such an organization.
   d. None of the students surveyed said they would contribute to religious organizations.
   e. The marginal distribution of Organization is 140, 110.

5. The mean birth weight of infants born at a certain hospital in the month of April was 128 oz. with a standard deviation of 10.2 oz. Which of the following is a correct interpretation of standard deviation?
   a. All the infants born in April weighed between 117.8 oz. and 138.2 oz.
   b. About half the infants born in April weighed between 117.8 oz. and 138.2 oz.
   c. The difference between the mean weight and the median weight of infants born in April was 10.2 oz.
   d. The distance between the weight of each infant born in April and the mean weight was, on average, about 10.2 oz.
   e. The mean weight of infants born in subsequent months is likely to be within 10.2 oz. of the mean weight in April.
6. A medical researcher collects health data on many women in each of several countries. One of the variables measured for each woman in the study is her weight in pounds. The following list gives the five-number summary for the weights of adult women in one of the countries.

Country A: 92, 110, 120, 160, 240

About what percent of Country A women weigh between 110 and 240 pounds?

a. 50%
b. 65%
c. 75%
d. 85%
e. 95%

7. The bar graph at right shows the distribution of breeds for all the champions of the annual World Canine Disc Championships from 1975 to 2009. Which of the following statement can be made on the basis of this graph?

a. Mixed breed dogs have won the championship twice as often as Australian Shepherds.
b. Most of the mixed breed dogs were at least half Border Collie.
c. None of the champion dogs were Labrador Retrievers.
d. The graph exaggerates the difference between the number of champions of each breed category.
e. Border Collies are larger dogs than Australian Shepherds.
8. A sample of 99 distances has a mean of 24 feet and a median of 24.5 feet. Unfortunately, it has just been discovered that the maximum value in the distribution, which was erroneously recorded as 40, actually had a value of 50. If we make this correction to the data, then
   a. the mean remains the same, but the median is increased.
   b. the mean and median remain the same.
   c. the median remains the same, but the mean is increased.
   d. the mean and median are both increased.
   e. we do not know how the mean and median are affected without further calculations, but the variance is increased.

9. A small company estimating its photocopying expenses finds that the mean number of copies made per day for the past 12 months is 258 copies per day with a standard deviation of 24 copies per day. Which of the following is a correct interpretation of standard deviation?
   a. The number of copies made per day was always between 234 and 282.
   b. About 95% of the time, the number of copies made per day was between 234 and 282.
   c. The difference between the mean number of copies made per day and the median number of copies made per day was 24.
   d. On average, the number of copies made each day was about 24 copies per day away from the mean, 258.
   e. 1.5 times the interquartile range of copies made per day is 24.

10. The five-number summary for scores on a statistics exam is 11, 35, 61, 70, 79. In all, 380 students took the test. About how many had scores between 35 and 61?
    a. 26
    b. 76
    c. 95
    d. 190
    e. None of these

11. At the beginning of the school year, a high-school teacher asks every student in her classes to fill out a survey that asks for their age, gender, the number of years they have lived at their current address, their favorite school subject, and whether they plan to go to college after high school. Which of the following best describes the variables that are being measured?
    a. four quantitative variables
    b. five quantitative variables
    c. two categorical variables and two quantitative variables
    d. two categorical variables and three quantitative variables
    e. three categorical variables and two quantitative variables
12. The graph below shows how mothers of young children respond to the question, “How many times a week do you choose fast food as a dining option for your family?”

What’s wrong with this method of presenting information?

a. This kind of data should always be presented in a pie chart.
b. The vertical axis should be “number of responses,” not “percentage of responses.”
c. The horizontal axis should be divided into more than three categories.
d. Using proportionally-sized hamburgers exaggerates differences between responses.
e. We don’t know if the mothers who responded were thinking about dinner, or both lunch and dinner.

13. A researcher reports that the participants in his study lost a mean of 10.4 pounds after two months on his new diet. A friend of yours comments that she tried the diet for two months and lost no weight, so clearly the report was a fraud. Which of the following statements is correct?

a. Your friend must not have followed the diet correctly, since she did not lose weight.
b. Since your friend did not lose weight, the report must not be correct.
c. The report gives only the mean. This does not imply that all participants in the study lost 10.4 pounds or even that all lost weight. Your friend’s experience does not necessarily contradict the study results.
d. In order for the study to be correct, we must now add your friend’s results to those of the study and recalculate the new average.
e. Your friend is an outlier.
14. When testing water for chemical impurities, results are often reported as bdl, that is, below detection limit. The following are the measurements of the amount of lead in a series of water samples taken from inner-city households (in parts per million):

5, 7, 12, bdl, 10, 8, bdl, 20, 6

Which of the following statements can we be sure is true?

a. The mean lead level in the water is about 10 ppm.
b. The mean lead level in the water is about 9 ppm.
c. The median lead level in the water is 7 ppm.
d. The median lead level in the water is 8 ppm.
e. Neither the mean nor the median can be computed because some values are unknown.

15. In 1965, the mean price of a new car was $2,650 and the standard deviation was $1000. In 2011, the mean was $30,500 and the standard deviation was $9000. If a Ford Mustang cost $2300 in 1965 and $28,000 in 2011, in which year was it more expensive relative to other cars?

a. 1965, because the standard score is higher than in 2011.
b. 1965, because the percentile is higher than in 2011.
c. 2011, because the standard score is higher than in 1965.
d. 2011, because the percentile is higher than in 1965.
e. We cannot compare the two prices, because we don’t know if the prices for each year are Normally distributed.

16. The cumulative relative frequency graph at right shows the distribution of lifespans for 39 U.S. presidents. Which of the following is closest to the 70th percentile of this distribution?

a. 50 years
b. 64 years
c. 70 years
d. 77 years
e. The answer cannot be determined from this graph.
17. Which of the following statements about standard deviation is true?
   a. Standard deviation measures the typical distance data points in a distribution are from the median.
   b. Regardless of what units the data are in, standard deviation has no units.
   c. Standard deviation is always a non-negative number.
   d. If the data is measured in hours, standard deviation would be measured in hours squared.
   e. Standard deviation is resistant to outliers.

18. One hundred people work at Lagtime Internet Services. Suppose after a particularly successful year, the president of the company decided to double his own salary and not change anyone else’s. Assuming the president makes more than anyone else, which of the following statements about changes in measures of center and spread is true?
   a. The mean and standard deviation will increase, but the median and interquartile range will stay the same.
   b. The mean and interquartile range will increase, but the median and standard deviation will stay the same.
   c. The mean, standard deviation, and interquartile range will increase, but the median will stay the same.
   d. The mean will increase, but the median, standard deviation, and interquartile range will stay the same.
   e. The mean, median, standard deviation, and interquartile range will all increase.
19. At right are box plots describing the distribution of prices paid for homes in two suburbs of Columbus, Ohio over a single 30-day period in 2012. Which of the following statements is supported by the information in this graph?

- Both of these distributions are strongly skewed to the right.
- The median house price in Dublin is higher than the 75th percentile of house price in Westerville.
- The mean house price in Dublin is about $100,000 higher than the mean in Westerville.
- Half of the houses sold in Westerville cost less than the cheapest 25% of houses in Dublin.
- The range of prices in Dublin was about 1.5 times the range of prices in Westerville.

20. Which of the following is closest to the 61st percentile of a standard Normal distribution?

- \( z = -0.7291 \)
- \( z = -0.28 \)
- \( z = 0.20 \)
- \( z = 0.28 \)
- \( z = 0.7291 \)
21. The weights of adult male Labrador Retrievers are approximately Normally distributed with a mean of 87 pounds and a standard deviation of 8 pounds. Which of the following statements is true?
   a. About 95% of adult male Labrador Retrievers weigh between 79 and 96 pounds.
   b. The median weight of adult male Labrador Retrievers is more than 87 pounds.
   c. The proportion of adult male Labrador Retrievers that weigh less than 80 pounds is approximately equal to the proportion that weigh more than 94 pounds.
   d. Almost all adult male Labrador Retrievers weigh more than 75 pounds.
   e. The standardized weights of 80-pound and 94-pound adult male Labrador Retrievers are roughly equal.

22. Other things being equal, larger automobile engines are less fuel-efficient. You are planning an experiment to study the effect of engine size (in liters) on the fuel efficiency (in miles per gallon) of sport utility vehicles. In this study,  
   a. gas mileage is a response variable, and you expect to find a negative association.
   b. gas mileage is a response variable, and you expect to find a positive association.
   c. gas mileage is an explanatory variable, and you expect to find a strong negative association.
   d. gas mileage is an explanatory variable, and you expect to find a strong positive association.
   e. gas mileage is an explanatory variable, and you expect to find very little association.

23. All but one of the following statements contains an error. Which statement could be correct?
   a. There is a correlation of 0.54 between the position a football player plays and his weight.
   b. We found a correlation of $r = -0.63$ between gender and political party preference.
   c. The correlation between the distance travelled by a hiker and the time spent hiking is $r = 0.9$ meters per second.
   d. We found a high correlation between the height and age of children: $r = 1.12$.
   e. The correlation between mid-August soil moisture and the per-acre yield of tomatoes is $r = 0.53$.

24. On May 11, 50 randomly selected subjects had their systolic blood pressure (SBP) recorded twice—the first time at about 9:00 a.m. and the second time at about 2:00 p.m. If one were to examine the relationship between the morning and afternoon readings, then one might expect the correlation to be 
   a. near zero, as morning and afternoon readings should be independent.
   b. high and positive, as those with relatively high readings in the morning will tend to have relatively high readings in the afternoon.
   c. high and negative, as those with relatively high readings in the morning will tend to have relatively low readings in the afternoon.
   d. near zero, as correlation measures the strength of the linear association.
   e. near zero, as blood pressure readings should follow approximately a Normal distribution.
25. A study examined the relationship between the sepal length and sepal width for two varieties of an exotic tropical plant. Varieties X and O are represented by x’s and o’s, respectively, in the following scatterplot. Which of the following statements is true?

a. Considering Variety X only, there is a positive correlation between sepal length and width.

b. Considering Variety O only, the least-squares regression line for predicting sepal length from sepal width has a positive slope.

c. Considering both varieties together, there is a negative correlation between sepal length and width.

d. Considering each variety separately, there is a negative correlation between sepal length and width.

e. Considering both varieties together, the least-squares regression line for predicting sepal length from sepal width has a negative slope.

26. A forester studying oak trees finds that the correlation between $x =$ the ages (measured in years) and $y =$ height (in feet) of a sample of trees is 0.78. Which of the following statements must be true?

a. 78% of the variability in tree heights can be explained by variation on the trees’ ages.

b. For every year a tree ages, its height increases, on average, by 78%.

c. If we let $x =$ height of tree and $y =$ age of tree, then the correlation would be the reciprocal of 0.78.

d. If we measure the height in meters instead of feet, the correlation would still be 0.78.

e. The unit for correlation in this context is foot-years.
The computer output below predicts air fare for a discount airline’s flights from Philadelphia to 13 different cities from the flight’s length in miles. A scatterplot of the data suggests that the relationship is roughly linear.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>101.24</td>
<td>13.49</td>
<td>7.50</td>
<td>0.000</td>
</tr>
<tr>
<td>Distance</td>
<td>0.02977</td>
<td>0.01107</td>
<td>2.69</td>
<td>0.021</td>
</tr>
</tbody>
</table>

\[ S = 20.7237 \quad R-Sq = 39.7\% \quad R-Sq(adj) = 34.2\% \]

27. One flight—Philadelphia to West Palm Beach, FL—is 953 miles long and costs $110. Which of the following expressions correctly represents the residual for this data point?
   a. \( 101.24 + 0.02977 \cdot 953 \)
   b. \( 953 - (101.24 + 0.02977 \cdot 110) \)
   c. \( (101.24 + 0.02977 \cdot 110) - 953 \)
   d. \( 110 - (101.24 + 0.02977 \cdot 953) \)
   e. \( (101.24 + 0.02977 \cdot 953) - 110 \)

28. The least squares regression line minimizes which one of the following quantities?
   a. The sum of the squared differences between the observed values of the response variable and the mean of the response variable.
   b. The sum of the squared differences between the observed values of the explanatory variable and the mean of the explanatory variable.
   c. The sum of the squared differences between the observed values of the response variable and the predicted values of the response variable.
   d. The sum of the squared differences between the observed values of the explanatory variable and the predicted values of the explanatory variable.
   e. The sum of the squared differences between the predicted values of the explanatory variable and the mean of the explanatory variable.

29. A recent investigation of prices for five-year-old Toyota Camrys in Montgomery, Alabama, and New York, New York, revealed that the mean price in Montgomery was $13,200 with a standard deviation of $1000. In New York, the mean price was $12,800 with a standard deviation of $1800. Which of the following statements is true?
   a. A car priced at $13,000 would have a negative standard score in both cities.
   b. The standard score for a car priced at $10,000 would be lower in New York than in Montgomery.
   c. The standard score for a car priced at $15,000 would be higher in Montgomery than in New York.
   d. A car with a standard score of 0 in Montgomery would have a negative standard score in New York.
   e. A car with a standard score of 0 in New York would also have a standard score of 0 in Montgomery.
30. All of the following small data sets have a mean of 5. Which one has the lowest standard deviation?
   a. 1 1 5 5 5 9 9
   b. 1 3 5 5 5 7 9
   c. 1 1 5 9 9
   d. 1 3 5 7 9
   e. 1 1 9 9

31. 1200 tomatoes have a mean weight of 143 grams and a standard deviation of 35 grams. If the weights are Normally distributed, approximately how many tomatoes weight between 73 grams and 178 grams?
   a. 384
   b. 600
   c. 816
   d. 978
   e. 1140

32. We wish to draw a sample of 5 without replacement from a population of 50 households. Suppose the households are numbered 01, 02, . . . , 50, and suppose that the relevant line of the random number table is 11362 35692 96237 90842 46843 62719 64049 17823.

   Then the households selected are
   a. households 11 13 36 62 73
   b. households 11 36 23 08 42
   c. households 11 36 23 08 42
   d. households 11 36 23 56 92
   e. households 11 35 96 90 46

33. To test the effect of music on productivity, a group of assembly line workers are given portable mp3 players to play whatever music they choose while working for one month. For another month, they work without music. The order of the two treatments for each worker is determined randomly. This is
   a. an observational study.
   b. a matched pairs experiment
   c. a completely randomized experiment.
   d. a block design, but not a matched pairs experiment.
   e. impossible to classify unless more details of the study are provided.

34. Which of the following is a method for improving the accuracy of a sample?
   a. Use no more than 3 or 4 words in any question.
   b. When possible, avoid the use of human interviewers, relying on computerized dialing instead.
   c. Use large sample sizes.
   d. Use smaller sample sizes.
   e. Ask only questions for which the responses are quantitative variables.
35. We say that the design of a study is biased if which of the following is true?
   a. A racial or sexual preference is suspected.
   b. Random placebos have been used.
   c. Certain outcomes are systematically favored.
   d. The correlation is greater than 1 or less than –1.
   e. An observational study was used when an experiment would have been feasible.

36. A sample of student opinion at a Big Ten university selects an SRS of 200 of the 30,000 undergraduate students and a separate SRS of 100 of the 5,000 graduate students. What is the term for this kind of sample?
   a. Simple random sample.
   b. Simple random sample with blocking.
   c. Multistage random sample.
   d. Stratified random sample.
   e. Cluster sample.

37. A recent survey by a Canadian magazine on the contribution of universities to the economy was circulated to 394 people who the magazine decided “are the most likely to know how important universities are to the Canadian economy.” Which of the following is the main problem with using these results to draw conclusions about the general public’s perception?
   a. Insufficient attention to the placebo effect.
   b. No control group.
   c. Lack of random assignment.
   d. Lack of random selection.
   e. Response bias.

38. For a certain experiment you have 8 subjects, of which 4 are female and 4 are male. The name of the subjects are listed below:
   **Males:** Atwater, Bacon, Chu, Diaz  **Females:** Johnson, King, Liu, Moore
   There are to be two treatment groups, A and B. If a randomized block design is used, with the subjects blocked by their gender, which of the following is not a possible group of subjects for treatment group A?
   a. Atwater, Chu, King, Liu
   b. Bacon, Chu, Liu, Moore
   c. Atwater, Diaz, Liu, King
   d. Atwater, Bacon, Chu, Johnson
   e. Atwater, Bacon, Johnson, King
The two-way table below gives information on seniors and juniors at a high school and by which means they typically get to school.

<table>
<thead>
<tr>
<th></th>
<th>Car</th>
<th>Bus</th>
<th>Walk</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juniors</td>
<td>146</td>
<td>106</td>
<td>48</td>
<td>300</td>
</tr>
<tr>
<td>Seniors</td>
<td>146</td>
<td>64</td>
<td>40</td>
<td>250</td>
</tr>
<tr>
<td>Totals</td>
<td>292</td>
<td>170</td>
<td>88</td>
<td>550</td>
</tr>
</tbody>
</table>

39. You select one student from this group at random. Which of the following statement is true about the events “Typically walks to school” and “Junior?”
   a. The events are mutually exclusive and independent.
   b. The events are not mutually exclusive but they are independent.
   c. The events are mutually exclusive, but they are not independent.
   d. The events are not mutually exclusive, nor are they independent.
   e. The events are independent, but we do not have enough information to determine if they are mutually exclusive.

40. Event A occurs with probability 0.2. Event B occurs with probability 0.8. If A and B are disjoint (mutually exclusive), then
   a. \( P(A \text{ or } B) = 1.0 \).
   b. \( P(A \text{ and } B) = 0.16 \).
   c. \( P(A \text{ and } B) = 1.0 \).
   d. \( P(A \text{ or } B) = 0.16 \).
   e. both A. and B. are true.

41. If \( P(A) = 0.24 \) and \( P(B) = 0.52 \) and A and B are independent, what is \( P(A \text{ or } B) \)?
   a. 0.1248
   b. 0.28
   c. 0.6352
   d. 0.76
   e. The answer cannot be determined from the information given

42. The probability of any outcome of a random phenomenon is
   a. the precise degree of randomness present in the phenomenon.
   b. any number as long as it is greater than 0 and less than 1.
   c. either 0 or 1, depending on whether or not the phenomenon can actually occur or not.
   d. the proportion of times the outcome occurs in a very long series of repetitions.
   e. none of the above.
43. A randomly selected student is asked to respond Yes, No, or Maybe to the question “Do you intend to vote in the next presidential election?” The sample space is {Yes, No, Maybe}. Which of the following represents a legitimate assignment of probabilities for this sample space?
   a. 0.4, 0.4, 0.2
   b. 0.4, 0.6, 0.4
   c. 0.3, 0.3, 0.3
   d. 0.5, 0.3, –0.2
   e. \(\frac{1}{4}, \frac{1}{4}, \frac{1}{4}\)

44. There are 10 red marbles and 8 green marbles in a jar. If you take three marbles from the jar (without replacement), the probability that they are all red is:
   a. 0.069
   b. 0.088
   c. 0.147
   d. 0.444
   e. 0.171

45. Jun and Deron are applying for summer jobs at a local restaurant. After interviewing them, the restaurant owner says, “The probability that I hire Jun is 0.7, and the probability that I hire Deron is 0.4. The probability that I hire at least one of you is 0.9.” What is the probability that both Jun and Deron get hired?
   a. 0.1
   b. 0.2
   c. 0.28
   d. 0.3
   e. 1.1

46. Experience has shown that a certain lie detector will show a positive reading (indicates a lie) 10% of the time when a person is telling the truth and 95% of the time when a person is lying. Suppose that a random sample of 5 suspects is subjected to a lie detector test regarding a recent one-person crime. Then the probability of observing no positive readings if all suspects plead innocent and are telling the truth is
   a. 0.409.
   b. 0.735.
   c. 0.00001.
   d. 0.591.
   e. 0.99999.

47. A fair coin is tossed four times, and each time the coin lands heads up. If the coin is then tossed 1996 more times, how many heads are most likely to appear in these 1996 additional tosses?
   a. 996
   b. 998
   c. 1000
   d. 1002
   e. 1996
The two-way table below gives information on the performers in the New York Philharmonic Orchestra, categorized by section (type of instrument) and gender.

<table>
<thead>
<tr>
<th></th>
<th>Strings</th>
<th>Woodwinds</th>
<th>Brass</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>24</td>
<td>8</td>
<td>12</td>
<td>44</td>
</tr>
<tr>
<td>Female</td>
<td>37</td>
<td>6</td>
<td>1</td>
<td>44</td>
</tr>
<tr>
<td>Totals</td>
<td>61</td>
<td>14</td>
<td>13</td>
<td>88</td>
</tr>
</tbody>
</table>

48. You select one musician from this group at random. What is the probability that this person plays a woodwind?
   a. 0.091
   b. 0.136
   c. 0.159
   d. 0.182
   e. 0.571

49. A die is loaded so that the number 6 comes up three times as often as any other number. What is the probability of rolling a 1 or a 6?
   a. 2/3
   b. 1/2
   c. 3/8
   d. 1/3
   e. 1/4

An event A will occur with probability 0.5. An event B will occur with probability 0.6. The probability that both A and B will occur is 0.1.

50. The conditional probability of A, given B
   a. is 1/2
   b. is 3/10
   c. is 1/5
   d. is 1/6
   e. cannot be determined from the information given.

51. We may conclude that
   a. events A and B are independent.
   b. events A and B are mutually exclusive.
   c. either A or B always occurs.
   d. events A and B are complementary.
   e. none of the above is correct.
Use the following information to answer the questions below:

A group of 125 pick-up truck owners were asked what brand truck they owned and whether it had four-wheel drive. The results are given in the two-way table below.

<table>
<thead>
<tr>
<th>Truck Brand</th>
<th>Four wheel drive?</th>
<th></th>
<th></th>
<th>Totals</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
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<td>Ford</td>
<td>28</td>
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<tr>
<td>Chevy</td>
<td>32</td>
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<td>50</td>
<td></td>
</tr>
<tr>
<td>Dodge</td>
<td>20</td>
<td>10</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>80</td>
<td>45</td>
<td>125</td>
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</tbody>
</table>

52. You randomly select one truck owner. What is the probability that he owns a Dodge or has four wheel drive?
   a. $\frac{20}{80}$
   b. $\frac{20}{125}$
   c. $\frac{80}{125}$
   d. $\frac{90}{125}$
   e. $\frac{110}{125}$
53. Let \( E = \{ \text{People in a random sample who regularly use the internet as a source of news.} \} \)
Let \( P = \{ \text{People in the same random sample who regularly use print media as a source of news.} \} \)
The Venn diagram below summarizes the distribution of these two categorical variables.

Which one of the two-way tables below conveys the same information?

```
a. \[
\begin{array}{c|cc|c}
 & P & P^c & \\
\hline
E & 23 & 17 & 40 \\
E^c & 35 & 10 & 45 \\
\hline & 58 & 27 & \\
\end{array}
\]

b. \[
\begin{array}{c|cc|c}
 & P & P^c & \\
\hline
E & 23 & 41 & 64 \\
E^c & 35 & 10 & 45 \\
\hline & 58 & 51 & \\
\end{array}
\]

c. \[
\begin{array}{c|cc|c}
 & P & P^c & \\
\hline
E & 10 & 41 & 51 \\
E^c & 35 & 23 & 58 \\
\hline & 45 & 64 & \\
\end{array}
\]

d. \[
\begin{array}{c|cc|c}
 & P & P^c & \\
\hline
E & 23 & 18 & 41 \\
E^c & 41 & 10 & 51 \\
\hline & 64 & 28 & \\
\end{array}
\]

e. \[
\begin{array}{c|cc|c}
 & P & P^c & \\
\hline
E & 23 & 12 & 35 \\
E^c & 18 & 10 & 28 \\
\hline & 41 & 22 & \\
\end{array}
\]
```
54. A biology teacher has just finished grading a quiz for a class of 26 students and has calculated measures of center and spread on the scores. While writing the grades on the quizzes, he realizes he made a mistake, and the highest grade should be 10 points higher. Which one of the following sets of measurements will he have to recalculate?
   a. The mean and median
   b. The mean and standard deviation
   c. The median and interquartile range
   d. The interquartile range and standard deviation
   e. The mean, standard deviation, and interquartile range

55. A marketing survey compiled data on the total number of televisions in households. If $X =$ the number of televisions in a randomly-selected household, and we omit the rare cases of more than 5 televisions, then $X$ has the following distribution:

<table>
<thead>
<tr>
<th>$X$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(X)$</td>
<td>0.24</td>
<td>0.37</td>
<td>0.20</td>
<td>0.11</td>
<td>0.05</td>
<td>0.03</td>
</tr>
</tbody>
</table>

What is the probability that a randomly chosen household has at least two televisions?
   a. 0.19
   b. 0.20
   c. 0.29
   d. 0.39
   e. 0.61

56. X and Y are independent random variables, and $a$ and $b$ are constants. Which one of the following statements is true?
   a. $\sigma_{X+Y} = \sigma_X + \sigma_Y$
   b. $Var(X - Y) = Var(X) + Var(Y)$
   c. $Var(a + bX) = b Var(X)$
   d. $\sigma_{X-Y} = \sigma_X - \sigma_Y$
   e. $Var(X + Y) = \sqrt{Var(X^2) + Var(Y^2)}$

57. In a large population of college students, 20% of the students have experienced feelings of math anxiety. If you take a random sample of 10 students from this population, the mean and standard deviation of the number of students in the sample who have experienced math anxiety is:
   a. $m = 1.6; s = 1.414$
   b. $m = 1.6; s = 1.265$
   c. $m = 2; s = 1.6$
   d. $m = 2; s = 1.1414$
   e. $m = 2; s = 1.265$
58. Jen’s commute to work requires that she take the Blue subway line, then transfer to the Red line. The length of the trip on the Blue line has a mean of 18 minutes with a standard deviation of 2 minutes. The Red line trip takes 12 minutes with a standard deviation of 1 minute. The waiting time between when she gets off the Blue line and her Red line train arrives has mean of 10 minutes and a standard deviation of 5 minutes. Assume (perhaps unrealistically) that these times are independent random variables. What are the mean and standard deviation of her entire commute?

a. Mean = 40 minutes; Standard deviation = 8 minutes
b. Mean = 40 minutes; Standard deviation = 5.48 minutes
c. Mean = 40 minutes; Standard deviation = 2.83 minutes
d. Mean = 30 minutes; Standard deviation = 5.48 minutes
e. Mean = 30 minutes; Standard deviation = 8 minutes

59. In the town of Tower Hill, the number of cell phones in a household is a random variable $W$ with the following distribution:

<table>
<thead>
<tr>
<th>$W$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(W)$</td>
<td>0.1</td>
<td>0.1</td>
<td>0.25</td>
<td>0.3</td>
<td>0.2</td>
<td>0.05</td>
</tr>
</tbody>
</table>

The probability that a randomly-selected household has at least two cell phones is

a. 0.20
b. 0.25
c. 0.55
d. 0.70
e. 0.80

In order to set premiums at profitable levels, insurance companies must estimate how much they will have to pay in claims on cars of each make and model, based on the value of the car and how much damage it sustains in accidents. Let $C$ be a random variable that represents the cost of a randomly selected car of one model to the insurance company. The probability distribution of $C$ is given below.

<table>
<thead>
<tr>
<th>$C$</th>
<th>$0$</th>
<th>$1000$</th>
<th>$4000$</th>
<th>$10,000$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$PC.$</td>
<td>0.60</td>
<td>0.05</td>
<td>0.13</td>
<td>0.22</td>
</tr>
</tbody>
</table>

60. The probability that the insurance company will have to pay a claim of at least $1000 for a randomly selected car is:

a. 0
b. 0.05
c. 0.13
d. 0.22
e. 0.40
61. Let the random variable $X$ represent the amount of money Dan makes doing lawn care in a randomly selected week in the summer. Assume that $X$ is Normal with mean $240 and standard deviation $60. The probability is approximately 0.6 that, in a randomly selected week, Dan will make less than
a. $144
b. $216
c. $255
d. $30
e. $360

62. A vending machine operator has determined that the number of candy bars sold per week by a certain machine is a random variable with mean 125 and standard deviation 7. His profit on each bar sold is $0.25, and it costs him $5.00 per week to maintain the machine and rent the space for it. What are the mean and standard deviation for $Y =$ the profit he earns from this machine in a randomly-selected week?

a. Mean = 31.25, Standard deviation $\sim$9.25
b. Mean = 31.25, Standard deviation $\sim$1.25
c. Mean = 31.25, Standard deviation $\sim$1.75
d. Mean = 26.25, Standard deviation $\sim$1.25
e. Mean = 26.25, Standard deviation $\sim$1.75

63. The probability that a certain crate has more than 4 contaminated chickens is
a. 0.0424
b. 0.0686
c. 0.8889
d. 0.9313
e. 0.9576

64. The mean and standard deviation of the number of contaminated chickens in a crate are
a. $m = 7; s = 2.24$
b. $m = 7; s = 2.68$
c. $m = 7; s = 5.04$
d. $m = 7.2; s = 2.24$
e. $m = 7.2; s = 5.04$

65. Which of the following random variables is geometric?

a. The number of phone calls received in a one-hour period
b. The number of times I have to roll a six-sided die to get two 5s.
c. The number of digits I will read beginning at a randomly selected starting point in a table of random digits until I find a 7.
d. The number of 7s in a row of 40 random digits.
e. All four of the above are geometric random variables.
Fall 2015 AP Statistics Final Review
Answer Section

MULTIPLE CHOICE

1. ANS: C  PTS: 1
2. ANS: B  PTS: 1
3. ANS: C  PTS: 1
4. ANS: C  PTS: 1
5. ANS: D  PTS: 1
6. ANS: C  PTS: 1
7. ANS: D  PTS: 1
8. ANS: C  PTS: 1
9. ANS: D  PTS: 1
10. ANS: C  PTS: 1
11. ANS: E  PTS: 1
12. ANS: D  PTS: 1
13. ANS: C  PTS: 1
14. ANS: C  PTS: 1
15. ANS: C  PTS: 1
16. ANS: D  PTS: 1
17. ANS: C  PTS: 1
18. ANS: A  PTS: 1
19. ANS: B  PTS: 1
20. ANS: D  PTS: 1
21. ANS: C  PTS: 1
22. ANS: A  PTS: 1
23. ANS: E  PTS: 1
24. ANS: B  PTS: 1
25. ANS: D  PTS: 1
26. ANS: D  PTS: 1
27. ANS: D  PTS: 1
28. ANS: C  PTS: 1
29. ANS: C  PTS: 1
30. ANS: B  PTS: 1
31. ANS: D  PTS: 1
32. ANS: B  PTS: 1
33. ANS: B  PTS: 1
34. ANS: C  PTS: 1
35. ANS: C  PTS: 1
36. ANS: D  PTS: 1
37. ANS: D  PTS: 1
38. ANS: D  PTS: 1
39. ANS: B  PTS: 1
40. ANS: A PTS: 1
41. ANS: C PTS: 1
42. ANS: D PTS: 1
43. ANS: A PTS: 1
44. ANS: C PTS: 1
45. ANS: B PTS: 1
46. ANS: D PTS: 1
47. ANS: B PTS: 1
48. ANS: C PTS: 1
49. ANS: B PTS: 1
50. ANS: D PTS: 1
51. ANS: C PTS: 1
52. ANS: D PTS: 1
53. ANS: B PTS: 1
54. ANS: B PTS: 1
55. ANS: D PTS: 1
56. ANS: B PTS: 1
57. ANS: E PTS: 1
58. ANS: B PTS: 1
59. ANS: E PTS: 1
60. ANS: E PTS: 1
61. ANS: C PTS: 1
62. ANS: E PTS: 1
63. ANS: C PTS: 1
64. ANS: D PTS: 1
65. ANS: C PTS: 1
1. C
2. B
3. C
4. C
5. D
6. C
7. D
8. C
9. D
10. C
11. E
12. D
13. C
14. D
15. E
16. B
14. C
15. C
16. D
17. C
18. A
19. B
20. D
21. C
22. A
23. E
24. B
25. D
26. D
27. D
28. C
29. C
30. B
31. D
32. B
33. B
34. C
35. C
36. D
37. D
38. D
39. B
40. A
41. C
42. D
43. A
44. C
45. B
46. D
47. B
C 61.

E 62.

C 63.

D 64.

C 65.