1. The probability of stock A rising is 0.6; and of stock B rising is 0.3. What is the probability that both stocks rise, (assume the two stocks are independent?)
   A) 0.12   B) 0.018   C) 0.90   D) 0.30   E) 0.18

2. 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) \( P(A \text{ and } B) = 1.0 \)
   C) \( P(A \text{ and } B) = 0.16 \)   D) \( P(A \text{ or } B) = 0.16 \)

3. In the graph below the circled point is
   A. an influential point. Deleting it should reduce the correlation and improve the fit.
   B. not an influential point because its \( y \) value is not unusually large or small.
   C. an influential point. Deleting it should increase the estimate of the slope.

4. In a study of cars that may be considered classics (all built in the 1970s), the least-squares regression line of mileage (in miles per gallon) on vehicle weight (in thousands of pounds) is calculated to be

   \[
   \text{mileage} = 45 - 7.5 \times \text{weight}
   \]

The mileage for a small Chevy is predicted to be 22 miles per gallon. What was the weight of this car?
   A) 172.5 lbs.
   B) 3067 lbs.  
   C) 8933 lbs.
   D) Cannot be determined from the information given.
5. Foresters use regression to predict the volume of timber in a tree using easily measured quantities such as diameter. Let Y be the volume of timber in cubic feet and X be the diameter in feet (measured at 3 feet above ground level, 1 ft = 12 inches). One set of data gives Y = -30 + 60x. The predicted volume for a tree of diameter = 18 inches is
A) 1050 cubic feet  B) 65 cubic feet  C) 90 cubic feet
D) 100 cubic feet  E) 60 cubic feet

Use the following to answer questions 6 & 7: A researcher wishes to determine whether the rate of water flow (in liters per second) over an experimental soil bed can be used to predict the amount of soil washed away (in kilograms). The researcher measures the amount of soil washed away for various flow rates, and from these data calculates the least-squares regression line to be amount of eroded soil = 0.4 + 1.3 \times (flow rate)

6. What do we know about the correlation between amount of eroded soil and flow rate?
A) \( r = 1/1.3 \)
B) \( r = 0.4 \)
C) It would be positive, but we cannot determine the exact value.
D) It would either be positive or negative. It is impossible to say anything about the correlation from the information given.

7. One of the flow rates used by the researcher was 0.3 liters per second and for this flow rate the amount of eroded soil was 0.8 kilograms. These values were used in the calculation of the least-squares regression line. What is the residual corresponding to these values?
A) 0.01  B) -0.01  C) 0.5  D) -0.5

8. A simple random sample of 200 athletes is selected from a large high school. In the sample, there are 20 football players. A student is selected randomly from this sample. What is the probability that the student is not a football player?
A) 0.09  B) 0.85  C) 0.90  D) 0.085
9. The residuals plot for a linear model is shown below.

Which is true?

A) The linear model is okay because approximately the same number of points are above the line as below it.

B) The linear model is no good because of the curve in the residuals.

C) The linear model is no good since some residuals are large.

D) The linear model is no good since the correlation is near 0.

E) The linear model is okay because the association between the two variables is fairly strong.

10. From a list of registered voters who are Democrats (D), Republicans (R) and Independents (I), 2 voters are randomly selected. The sample space of this experiment is \{D, R, I\}.

A) TRUE

B) FALSE

11. Belgium has two official languages — French and Dutch. Assume that about 60% of the people speak Dutch and 40% of the people speak French. Define the event A as the event that two randomly selected Belgians speak the same language. What is the complement of the event A?

A) 0.48

B) 0.52

C) \{\text{(Dutch, French)}, \text{(French, Dutch)}\}

D) \{\text{(French, French)}, \text{(Dutch, Dutch)}\}

12. A residuals plot is useful because

I. it will help us to see whether a linear model makes sense

II. it might show a pattern in the data that was hard to see in the original scatterplot

Which of the following is true?

A) I only

B) II only

C) I and II

D) neither I nor II

13. A correlation of zero between two quantitative variables means that

A) we have done something wrong in our calculation. It is impossible for correlation to be 0.

B) there is no association between the two variables

C) there is no linear association between the two variables

D) re-expressing the data is needed to guarantee a linear association between the two variables
Use the following for 14 to 16: The Biology Department plans to recruit a new faculty member. Data collected by a different university on the 410 possible candidates is available. The Biology Department is debating to put a requirement of 10 years of teaching experience in the job advertisement. The available data on the candidates is shown below:

<table>
<thead>
<tr>
<th></th>
<th>Less than 10 years experience</th>
<th>10 or more years experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>178</td>
<td>112</td>
</tr>
<tr>
<td>Female</td>
<td>99</td>
<td>21</td>
</tr>
</tbody>
</table>

14. What is the probability that a candidate has less than 10 years experience?
   A) 0.676  B) 0.324  C) 178  D) 0.50

15. What is the conditional probability that a candidate has less than 10 years experience given that she is a female?
   A) 0.676  B) 0.324  C) 0.825  D) 0.90

16. What is the probability that a candidate is male given that he has 10 or more years of experience?
   A) 0.676  B) 0.324  C) 0.612  D) 0.84

Use the following for Questions 17 & 18: A pharmaceutical company submits a proposal to provide medical equipment and supplies to Sparrow Hospital. The proposal will be reviewed by an executive board member, either Ms. Allen or Mr. Barnes. In the past, Ms. Allen has accepted 80% of the company’s proposal while Mr. Barnes has accepted 75%. There is a 60% chance that Ms. Allen will receive the proposal.

17. Find the probability that the proposal will be accepted.
   A) 0.78  B) 0.6  C) 0.225  D) 0.645

18. If a proposal is denied, what is the chance that it was reviewed by Ms. Allen?
   A) 0.85  B) 0.79  C) 0.4  D) 0.55

19. A study is conducted to determine if one can predict the yield of a crop based on the amount of yearly rainfall. The response variable in this study is
   A) the amount of rainfall
   B) the crop yield
   C) the average temperature during the study time
   D) the researchers who conducted the study

20. The following values are listed as coefficients of correlation ($r$). Which one indicates a strong negative relationship between the variables $x$ and $y$?
   A) -0.05  B) -0.9  C) 0.4  D) 1.1  E) -1.2
Use the following to answer questions 21 & 22: A survey of college students finds that 40% like country music, 30% like gospel and 10% like both.

21. What percent like neither country nor gospel?
(A) 0.10  (B) 0.4  (C) 0.20  (D) 0.25

22. What is the probability that a randomly selected college student likes country music given that the student likes gospel?
A) 0.65  B) 0.17  C) 0.33  D) 0.49

23. A college basketball player makes 60% of his free throws. Assume free throws are independent. What is the probability that he makes all his four free throws?
A) 0.6  B) 0.32  C) 0.7  D) 0.13

24. Residuals are
A) variation in the data that is explained by the model.
B) possible models not explored by the researcher.
C) data collected from individuals that is not consistent with the rest of the group.
D) the difference between observed responses and values predicted by the model.
E) none of these

25. A study found a correlation of $r = -0.61$ between the gender of a worker and his or her income. Which of the following conclusions regarding this correlation coefficient is true?
A) Women earn more than men on the average.
B) Women earn less than men on the average.
C) An arithmetic mistake was made. Correlation must be positive.
D) This measurement makes no sense; $r$ can only be measured between two quantitative variables.
26. Consider the following scatterplot of two variables $X$ and $Y$.

![Scatterplot of two variables $X$ and $Y$.]

What can we conclude from this graph?

A) The correlation between $X$ and $Y$ must be close to 1 because there is nearly a perfect relationship between them.
B) The correlation between $X$ and $Y$ must be close to $-1$ because there is nearly a perfect relationship between them, but it is not a straight-line relation.
C) The correlation between $X$ and $Y$ is close to 0.
D) The correlation between $X$ and $Y$ could be any number between $-1$ and $+1$. Without knowing the actual values, we can say nothing more.

27. Which of the following statements is true.

A) The least-squares regression line is the line that makes the square of the correlation in the data as large as possible.
B) The least-squares regression line is the line that makes the sum of the squares of the vertical distances of the data points from the line as small as possible.
C) The least-squares regression line is the line that best splits the data in half, with half of the points above the line and half below the line.
D) The least-squares regression line always passes through the origin

28. A bag has 9 pieces of fruit: 3 apples, 3 pears, and 3 oranges. Three pieces of fruit are picked randomly. Let $A$ be the event “Get 1 apple, 1 pear, 1 orange”, $B$ be the event “Get at least 2 apples”. Which of the following is in the complement of $B$?

A. {Apple, Orange, Pear}  
B. {Apple, Apple, Pear}  
C. {Orange, Pear, Pear}  
D. {Apple, Apple, Apple}  
E. A and C are true
29. Which one of the following statements below contains no mistake?
A) The correlation between height and weight is 0.568 inches per pound
B) The correlation between height and weight is 0.568
C) The correlation between the breed of a dog and its weight is 0.568
D) The correlation between gender and age is -0.568
E) If the correlation between blood alcohol level and reaction time is 0.73, then the correlation between reaction time and blood alcohol level is -0.73.

30. A national consumer magazine reported the following correlations: The correlation between car weight and car reliability is -0.40 and the correlation between car weight and annual maintenance cost is 0.20. Which of the following statements are true?
   I. Heavier cars tend to be less reliable
   II. Heavier cars tend to cost more to maintain.
   III. Car weight is related more strongly to reliability than to maintenance cost.
   A) I only
   B) II only
   C) III only
   D) I and II
   E) I, II and III