Answers:

1. 36/125
2. 0.46
3. 8/3
4. 6
5. Categorical (Qualitative)
6. 3
7. 682
8. Cluster (sampling)
9. 8.7
10. 10
11. -1
12. 120
13. 28
14. 4
15. 8
16. D
17. 2/21
18. 97.35%
19. Type II
20. 1/39
21. 3
22. $\frac{\sqrt{3}}{80}$
23. 1260
24. $\frac{-\sqrt{22}}{5}$
25. 0.8

Solutions:

1. $\frac{3}{5}\left[\frac{2}{5}\right]^2 (3ways) = \frac{36}{125}$

2. A uniform distribution is a rectangle with equal height. If the range of the x values is from 0 to 1, that means the height is a constant 1 unit. Probability is found by calculating area, so the rectangle area would be (0.74-0.28)(1)=0.46

3. By arranging the values in order and dividing into 4 equal divisions, the Q1=6 and the Q3=16.
$\frac{Q3}{Q1} = \frac{16}{6} = \frac{8}{3}$

4. IQR=Q3-Q1. From the Box and Whisker Plot, the Quartiles are the line segments representing the edges of the box. 20-14=6

5. Categorical (Qualitative) data best fits into a pie chart.

6. By substituting 10 into the linear regression equation, we find the expected value to be 33. Residuals are calculated as Observed-Expected. 36-33=3.

7. Using the Empirical Rule, the 84th percentile would be represented by a score 1 standard deviation about the mean. 650+32=682.

8. Cluster Sampling (Some might think this is Stratified, but when you are using Stratified, we randomly sample from each of the groups (Strata)).

9. Expected Value of a discrete random variable is found by finding the sum of each possible value multiplied by its probability. $(-5)(\frac{1}{10}) + (8)(\frac{1}{4}) + (10)(\frac{3}{10}) + (12)(\frac{7}{20}) = 8.7$

10. The width of a confidence interval is found by doubling the margin of error. Since the population standard deviation was given, we will be using a z distribution.

$ME = z * \frac{\sigma}{\sqrt{n}} = 1.96\frac{10}{\sqrt{16}} = 4.9$

$2ME = 9.8 \approx 10$

11. $t = \dfrac{4-6}{\dfrac{12}{\sqrt{36}}} = -1$

12. Because getting 1st place is different than earning 3rd place, this is an example of a Permutation. ${}_6P_3 = \dfrac{6!}{3!} = 120$

13. The Five Number Summary for this data: Min: 1 Q1: 6 M:9 Q3: 12 Max:28. IQR=12-6=6.
$Q_1 - 1.5IQR = -3$
$Q_3 + 1.5IQR = 21$ The only number more extreme than those two values is 28.

14. Weight, Length, Time, Volume are all examples of continuous random variables. Usually when you measure something, it is continuous!

15. The explanatory is the x variable, so we are going to solve for x. $\dfrac{x!4!}{(x-1)!} = \dfrac{x(24)}{1} = 192; x = 8$

16. The numbers are all far off of the expected value, but close together. That means low variability, but high bias.

17. $\dfrac{5}{15} \bullet \dfrac{4}{14} = \dfrac{2}{21}$

18. 24 is two standard deviations below the mean. Using the empirical rule, that gives $\dfrac{95}{2} = 47.5\%$ to the left of the mean. 34 is 3 standard deviations above the mean, so that gives $\dfrac{99.7}{2} = 49.85\%$. The total probability = 97.35%

19. To fail to reject when the null hypothesis is actually false is a Type II Error.

20. Give that the card is not a spade, that only leaves 39 cards to pick from. There is only one other black jack, found in the clubs suit. $1/39$

21. From the empirical rule, 3.

22. $\sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{\left(\frac{1}{4}\right)\left(\frac{3}{4}\right)}{400}} = \frac{\sqrt{3}}{80}$

23. $\frac{7!}{2!2!} = 1260$

24. Coefficient of Determination is r squared, so when we square root the value, the correlation could be positive or negative. The least value will be the negative one. $\sqrt{\frac{88}{100}} = \pm\frac{\sqrt{22}}{5}$

25.