2023 AP Daily: Practice Sessions

AP Statistics
Session 5 – MCQ

1. An agricultural engineer selected a random sample of 30 farms in the United States to construct a 95 percent confidence interval for the mean size, in acres, of farms in the United States. The resulting interval was (367,558). Which of the following is an appropriate interpretation of the 95 percent confidence level?

   A. Approximately 95% of the farm sizes in the sample are between 367 acres and 558 acres.
   B. Approximately 95% of all farm sizes in the United States are between 367 acres and 558 acres.
   C. Approximately 95% of all random samples of size 30 from the population will have a mean farm size between 367 acres and 558 acres.
   D. Approximately 95% of all random samples of size 30 from the population will produce intervals that contain the mean size of farms in the United States.
   E. Approximately 95% of all random samples of size 30 from the population will produce intervals that contain the sample mean.

2. The manager of a car company will select a random sample of its customers to create a 90 percent confidence interval to estimate the proportion of its customers who have children. Of the following, which is the smallest sample size that will result in a margin of error of no more than 6 percentage points?

   A. 100
   B. 125
   C. 150
   D. 200
   E. 275

3. The mayor of a large city will run for governor if he believes that more than 30 percent of the voters in the state already support him. He will have a survey firm ask a random sample of n voters whether or not they support him. He will use a large sample test for proportions to test the null hypothesis that the proportion of all voters who support him is 30 percent or less against the alternative that the percentage is higher than 30 percent. Suppose that 35 percent of all voters in the state actually support him. In which of the following situations would the power for this test be highest?

   A. The mayor uses a significance level of 0.01 and $n = 250$ voters.
   B. The mayor uses a significance level of 0.01 and $n = 500$ voters.
   C. The mayor uses a significance level of 0.01 and $n = 1,000$ voters.
   D. The mayor uses a significance level of 0.05 and $n = 500$ voters.
   E. The mayor uses a significance level of 0.05 and $n = 1,000$ voters.

4. A sports physician conducted a study to investigate whether there is an association between running experience and the occurrence of a certain sport injury for marathon runners while training for a marathon. Data were collected on a random sample of 51 marathon runners. Each runner from the sample was categorized by running experience (low, medium, high) and whether or not the runner experienced the sport injury while training for a marathon. The conditions for inference were met, and a χ^2 test statistic of approximately 8.12 was calculated. Which of the following describes the p-value of the test?

   A. p-value > 0.25
   B. $0.10 < p$-value < 0.25
   C. $0.05 < p$-value < 0.10
   D. $0.01 < p$-value < 0.05
   E. p-value < 0.01

Variable	N	Mean	SE Mean	StDev
Running time	11	74.81	2.21	7.33

Predictor	Coef	SE Coef
Constant	88.01	0.49
Exercise time	−2.20	0.07

S = 0.76   R-Sq = 99.0%

5. A research study indicated a negative linear relationship between two variables: the number of hours per week spent exercising (exercise time) and the number of seconds it takes to run one lap around a track (running time). Computer output from the study is shown above.

   Assuming that all conditions for inference are met, which of the following is an appropriate test statistic for testing the null hypothesis that the slope of the population regression line equals 0?

   A. $t = \dfrac{88.01}{0.49}$

   B. $t = \dfrac{74.81}{7.33}$

   C. $t = \dfrac{74.81}{2.21}$

   D. $t = \dfrac{-2.20}{0.07}$

   E. $t = \dfrac{-2.20}{\frac{0.07}{\sqrt{11}}}$

6. A team of psychologists studied the effect of multitasking on the completion of cognitive tasks. A group of 40 women participated in the study. Each woman owned a smartphone equipped with the same type of keyboard. The women typed a text passage on the phone twice, one time while sitting in a quiet room (a single task) and the other time while walking (a multitask). The order of the single task and the multitask was randomly determined for each woman. The psychologists recorded the time it took each woman to type the text for both tasks. If the conditions of inference are met, which of the following tests is most appropriate to analyze the data?

   A. A two-sample t-test for a difference between means
   B. A matched-pairs t-test for a mean difference
   C. A one-sample z-test for a proportion
   D. A two-sample z-test for a difference between proportions
   E. A chi-square test of independence