"FRAPPY"
{Free Response AP Problem...Yay!}

The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 15 minutes. You will be graded based on the AP rubric and will earn a score of 0-4. After grading, keep this problem in your binder for your AP Exam preparation.

Researchers want to determine whether drivers are significantly more distracted while driving when using a cell phone than when talking to a passenger in the car. In a study involving 48 people, 24 people were randomly assigned to drive in a driving simulator while using a cell phone. The remaining 24 were assigned to drive in the driving simulator while talking to a passenger in the simulator. Part of the driving simulation for both groups involved asking drivers to exit the freeway at a particular exit. In the study, 7 of the 24 cell phone users missed the exit, while 2 of the 24 talking to a passenger missed the exit.

Scoring:

(a) Would this study be classified as an experiment or an observational study? Provide an explanation to support your answer.

E I

(b) State the null and alternative hypotheses of interest to the researchers.

E I

(c) One test of significance that you might consider using to answer the researchers' question is a two-sample *z*-test. State the conditions required for this test to be appropriate. Then comment on whether each condition is met.

E P I

(d) Using an advanced statistical method for small samples to test the hypotheses in part (b), the researchers report a *p*-value of 0.0683. Interpret, in everyday language, what this *p*-value measures in the context of this study and state what conclusion should be made based on this *p*-value.

E P I

Total:__/4

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One of the two fire stations in a certain town responds to calls in the northern half of the town, and the other fire station responds to calls in the southern half of the town. One of the town council members believes that the two fire stations have different mean response times. Response time is measured by the difference between the time an emergency call comes into the fire station and the time the first fire truck arrives at the scene of the fire.

Data were collected to investigate whether the council member's belief is correct. A random sample of 50 calls selected from the northern fire station had a mean response time of 4.3 minutes with a standard deviation of 3.7 minutes. A random sample of 50 calls selected from the southern fire station had a mean response time of 5.3 minutes with a standard deviation of 3.2 minutes.

Scoring:

(a) Construct and interpret a 95 percent confidence interval for the difference in mean response times between the two fire stations.

E I

E I

E I

(b) Does the confidence interval in part (a) support the council member's belief that the two fire stations have different mean response times? Explain.

E P I

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A humane society wanted to estimate with 95 percent confidence the proportion of households in its county that own at least one dog.

Scoring:

(a) Interpret the 95 confidence level in this context.

E P I

The humane society selected a random sample of households in its county and used the sample to estimate the proportion of all households that own at least one dog. The conditions for calculating a 95 percent confidence interval for the proportion of households in this county that own at least one dog were checked and verified, and the resulting confidence interval was 0.417 ± 0.119.

(b) A national pet products association claimed that 39 percent of all American households owned at least one dog. Does the humane society's interval estimate provide evidence that the proportion of dog owners in its county is different from the claimed national proportion? Explain.

E P I

(c) How many households were selected in the humane society's sample? Show how you obtained your answer.

E P I

Total:__/4