

## AP Statistics Exam Review Quiz #3 - 2015

### Multiple Choice (4 questions)

- 
1. A baseball coach wants to compare the number of hits by two groups of batters each using a different type of bat. Which type of graphical display would NOT be appropriate?
- a) Parallel boxplots
  - b) Dotplots drawn on the same scale
  - c) Back-to-back stemplots
  - d) Histograms drawn on the same scale
  - e) Scatterplot
- 
2. A new medication has been developed to cure a certain disease. The disease progresses in three stages, stages I, II, and III, each progressively worse than the one before it. Ninety volunteers are gathered to test the new medication, 30 in each of the three stages of the disease. The medication will be administered to subjects daily in one of three dosages: 100 mg for each subject in stage I of the disease, 200 mg to each subject in stage II, and 400 mg to each subject in stage III. After 8 weeks, the proportion of subjects cured of the disease will be recorded. Why is this NOT a good experimental design?
- I. Because experiments of this type should only use one dosage level of medication.
  - II. Because disease stage is potentially confounded with dosage level.
  - III. Because the experiment lacks a control group.
- a) I only
  - b) II only
  - c) I and II only
  - d) II and III only
  - e) I, II, and III
- 
3. The traffic safety officer of a local police force was trying to see if there was an association between the number of cars that did not use a main intersection in town because of the traffic light and the number of tickets written for speeding on the alternate route. The correlation between these two variables was found to be 0.58. Which of the following statements is true?
- a) About 58% of the variation in the number of speeding tickets can be explained by the linear relationship between the number of speeding tickets issued and the number of cars that did not use the main intersection in town.
  - b) Any potential linear relationship between the number of cars not using the main intersection in town and the number of speeding tickets written on an alternate route would be positive.
  - c) If one uses the main intersection through town, one is 58% more likely to receive a ticket than using the alternate route.
  - d) Since the correlation is not close to 1, there cannot be a linear relationship between the number of cars not using the main intersection in town and the number of speeding tickets written on an alternate route.
  - e) Getting a speeding ticket is a direct cause of taking the alternate route.

- 
4. A tire manufacturer is testing a new tread design for its light-truck tires. The previous design had a mean tread life of 47,500 miles. Tires with the new design are manufactured and tested on a variety of light trucks. Which of the following is the correct pair of hypotheses to test the assertion that the new tread design has a longer life than the old design?
- a)  $H_0: \mu < 47,500$ ,  $H_a: \mu = 47,500$
  - b)  $H_0: \mu = 47,500$ ,  $H_a: \mu \neq 47,500$
  - c)  $H_0: \mu = 47,500$ ,  $H_a: \mu < 47,500$
  - d)  $H_0: \mu = 47,500$ ,  $H_a: \mu > 47,500$
  - e)  $H_0: \mu > 47,500$ ,  $H_a: \mu \leq 47,500$

### Free Response (1 Question)

When a tractor pulls a plow through an agricultural field, the energy needed to pull that plow is called the draft. The draft is affected by environmental conditions such as soil type, terrain, and moisture.

A study was conducted to determine whether a newly developed hitch would be able to reduce draft compared to the standard hitch. (A hitch is used to connect the plow to the tractor.) Two large plots of land were used in this study. It was randomly determined which plot was to be plowed using the standard hitch. As the tractor plowed that plot, a measurement device on the tractor automatically recorded the draft at 25 randomly selected points in the plot.

After the plot was plowed, the hitch was changed from the standard one to the new one, a process that takes a substantial amount of time. Then the second plot was plowed using the new hitch. Twenty-five measurements of draft were also recorded at randomly selected points in this plot.

- (a) What was the response variable in this study?

Identify the treatments.

What were the experimental units?

- (b) Given that the goal of the study is to determine whether a newly developed hitch reduces draft compared to the standard hitch, was randomization used properly in this study? Justify your answer.
- (c) Given that the goal of the study is to determine whether a newly developed hitch reduces draft compared to the standard hitch, was replication used properly in this study? Justify your answer.
- (d) Plot of land is a confounding variable in this experiment. Explain why.