

AP Stats
Review HW #5

MULTIPLE CHOICE

- The salaries for an electronics company were posted in their annual sales report for all stockholders. The president of the company makes the most money. His salary was mistakenly shown to be \$25,000 less than it actually is. Even with the mistake, his salary is still higher than anyone else's. Which statistic did NOT change after the mistake was corrected?
A. Standard deviation
B. Mean
C. Median
D. Variance
E. Range
- Which of the following allow inference about a population parameter?
I. A randomized controlled experiment using volunteers
II. An observational study using volunteers
III. A survey of a random sample from the population
A. I only
B. II only
C. III only
D. I and II only
E. I and III only
- The least-square regression line has been computed to predict the yield of a certain variety of roses from the number of seeds planted. The equation is $\hat{y} = -1.05 + 0.385x$. What does the model predict the yield will be for 18 seeds planted?
A. About 6
B. About 18
C. About 50
D. About 690
E. There are not enough seeds to yield any plants
- Baccarat is a casino card game between a "player" and a "dealer" where bettors wager on which will have the higher hand. Let Y represent the amount won or lost by the bettor on a single wager on the "dealer." The expected value of Y is $-\$1.06$ and the standard deviation of Y is $\$92.72$. If a bettor places 400 wagers on the "dealer" during the course of a gambling session, what is the approximate probability that the bettor ends up with a positive outcome, that is, makes money?
A. 0
B. 0.410
C. 0.495
D. 0.500
E. 0.590
- There is presently a dispute about allocations of federal funds to schools in two regions of a large school district. The director of federal funds, whose spouse works in the West region, has been accused of providing more money to schools in the West region than the East region. Two sets of data are gathered by the school board: one listing the amount of money allocated per pupil in the 26 West region schools, the other listing the same for the 26 East region schools. The school board wants to make a graph showing a comparison of the spending between the regions. Which of the following graphs is *inappropriate* to make such a comparison?
A. A scatterplot
B. Parallel boxplots
C. Back-to-back stemplots
D. Parallel dotplots using the same scale
E. Parallel histograms using the same scale
- The number of team flags the booster club will sell at a football game has the probability distribution as shown in the table below.

Number of team flags (x)	5	6	7	8	9	10
$P(x)$	0.20	0.15	0.10	0.25	0.18	0.12

If each team flag costs \$8.00, what is the expected amount of money the booster club will take in at a football game?

- A. \$7.42
B. \$8.00
C. \$53.15
D. \$59.36
E. \$64.00

7. In the computation of a confidence interval, if the sample size is not changed, but the confidence level is changed from 99% to 95%, you can expect
- An interval with the same width since the mean has not changed
 - An interval with the same width since the sample size has not changed
 - An interval that is wider
 - An interval that is narrower
 - The change cannot be determined from the information given
8. The makers of Save-More Showerheads claim that their showerhead will save water and therefore save money on water bills. They cite evidence from a recent study where sales records from a home improvement center were used to identify customers who purchased a Save-More Showerhead. Twenty of these customers were contacted and 19 of them indicated that they use less water in the month following the installation of the showerhead. Which of the following statements best describes the claim made by the makers of the showerheads?
- It is valid. The evidence shows lower water use by nearly all customers.
 - It is invalid because there were not enough customers in the study.
 - It is invalid because changes in water usage due to the showerhead are confounded with other variables.
 - It is invalid because Save-More should have sold more than one type of showerhead.
 - It is invalid because no other brands of showerheads were included in the study.
9. A significance test is performed with a significance level of $\alpha = 0.05$. For a particular value of the population parameter, the probability of committing a Type II error is computed to be $\beta = 0.13$. What is the power of the test for this situation?
- 0.05
 - 0.13
 - 0.82
 - 0.87
 - 0.95
10. Alex, Bryan, and Charlie are all playing tennis matches in a tournament against different opponents. Based on previous performances, there is a 0.4 probability that Alex will win his first match, a 0.3 probability that Bryan will win his first match, and a 0.2 probability that Charlie will win his first match. If the chance that each wins his match is independent of the others, what is the probability that none of them wins in their first matches?
- 0.024
 - 0.304
 - 0.336
 - 0.700
 - 0.900

AP Questions

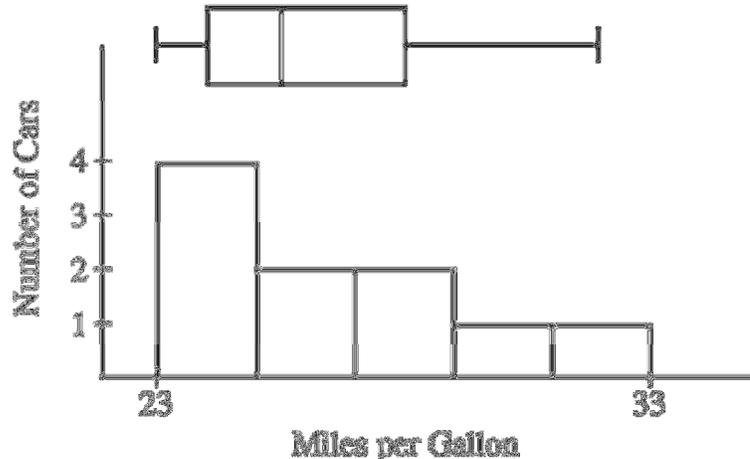
11. A humane society wanted to estimate with 95 percent confidence the proportion of households in its county that own at least one dog.
- (a) Interpret the 95 percent confidence level in this context.

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 .

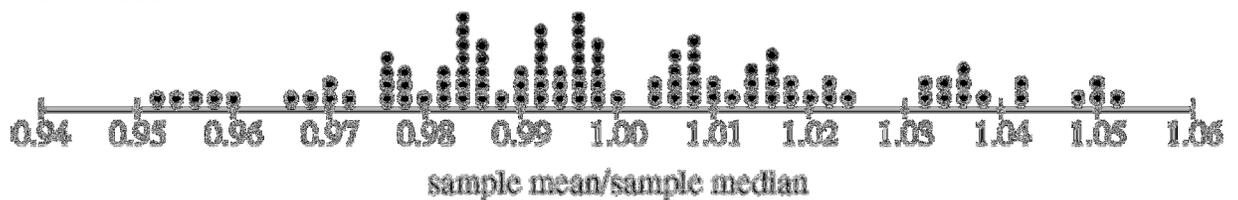
- (b) A national pet products association claimed that 39 percent of all American households owned at least one dog. Does the humane society's interval estimate provide evidence that the proportion of dog owners in its county is different from the claimed national proportion? Explain.
- (c) How many households were selected in the humane society's sample? Show how you obtained your answer.

12. A consumer organization was concerned that an automobile manufacturer was misleading customers by overstating the average fuel efficiency (measured in miles per gallon, or mpg) of a particular car model. The model was advertised to get 27 mpg. To investigate, researchers selected a random sample of 10 cars of that model. Each car was then randomly assigned to a different driver. Each car was driven for 5,000 miles, and the total fuel consumption was used to compute mpg for that car.
- (a) Define the parameter of interest and state the null and alternative hypotheses the consumer organization is interested in testing.

One condition for conducting a one-sample t-test in this situation is that the mpg measurements for the population of cars of this model should be normally distributed. However, the boxplot and histogram shown below indicate that the distribution of the 10 sample values is skewed to the right.



- (b) One possible statistic that measures skewness is the ratio $\frac{\text{sample mean}}{\text{sample median}}$. What value of that statistic (small, large, close to one) might indicate that the population distribution of mpg values is skewed to the right? Explain.
- (c) Even though the mpg values in the sample were skewed to the right, it is still possible that the population distribution of mpg values is normally distributed and that the skewness was due to sampling variability. To investigate, 100 samples, each of size 10, were taken from a normal distribution with the same mean and standard deviation as the original sample. For each of those 100 samples, the statistic $\frac{\text{sample mean}}{\text{sample median}}$ was calculated. A dotplot of the 100 simulated statistics is shown below.



In the original sample, the value of the statistic $\frac{\text{sample mean}}{\text{sample median}}$ was 1.03. Based on the value of 1.03 and the dotplot above, is it plausible that the original sample of 10 cars came from a normal population, or do the simulated results suggest the original population is really skewed to the right? Explain.

- (d) The table below shows summary statistics for mpg measurements for the original sample of 10 cars.

Minimum	Q1	Median	Q3	Maximum
23	24	25.5	28	32

Choosing only from the summary statistics in the table, define a formula for a different statistic that measures skewness.

What value of that statistic might indicate that the distribution is skewed to the right? Explain.