

Statistics for Strategy Whitten Spring 2012
Exam 1 Additional Practice Questions

Directions: The exam format is multiple choice. Choose the single best answer for each question. Answers and a formula sheet are found at back.

Disclaimer: These practice questions are intended to familiarize you with the *style* of the exam. The content of actual exam questions will differ.

Questions 1–3.

The length (from head to tail) of Tiberian rats (native to the Tiberius islands) is normally distributed. The measured lengths (in inches) of a sample of six rats are

9.2 10.6 4.2 6.5 12.2 8.4

(Use at least 2 decimal places accuracy in calculations.)

1. Find a 95% confidence interval for the mean length of all Tiberian rats, in inches.
(a) 5.51 to 11.53 (b) 5.65 to 11.39 (c) 5.22 to 11.82 (d) 5.77 to 11.27
(e) 7.29 to 9.75
2. Find a 99% confidence interval for the mean length of all Tiberian rats, in inches.
(a) 4.21 to 12.83 (b) 3.80 to 13.24 (c) 4.18 to 12.86 (d) 6.59 to 10.45
(e) 3.35 to 13.69
3. Which of the following statements is true?
 - (a) The 99% interval is wider (less precise) than the 95% interval in order to provide increased confidence.
 - (b) The 99% interval is narrower (more precise) than the 95% interval in order to provide increased confidence.
 - (c) The 99% interval is contained within the 95% interval.
 - (d) The 95% interval uses a greater margin of error.
 - (e) None of the above statements is correct.

Questions 4–5.

4. The UI Athletic Department conducted a survey to ask UI students if they are willing to pay an extra \$20 for football tickets in return for better seats in Kinnick Stadium. Only 21% of surveyed students are willing to pay the extra cost. Describe the population.
- (a) All surveyed students
 - (b) The number of all UI students who are willing to pay the extra cost
 - (c) All UI students
 - (d) The proportion of all UI students who are willing to pay the extra cost
 - (e) None of the above
5. The patrons of a particular bar in downtown Iowa City drink an average of 2.36 beers per visit. 150 such patrons on a recent Friday night drank a total of 375 beers. Which of the following equations is correct?
- (a) $\bar{x} = 2.36$
 - (b) $\bar{x} = 375$
 - (c) $\mu = 375$
 - (d) $\hat{p} = 150$
 - (e) None of the the above

Questions 6–11.

A recent random sample of 112 postal employees found that these employees had worked for the postal service for an average of 7.2 years, with a standard deviation of 2.0 years. Twenty years ago, the average period for postal service employment was 7.5 years. Do the sample data show that the average period for postal service employment has changed compared to 20 years ago? Use $\alpha = .10$.

(Use at least 4 decimal places accuracy in calculations.)

6. Define the parameter.

- (a) μ = average period (in years) for postal service employment 20 years ago
- (b) p = proportion of postal employees who have worked at the postal service for more than 7.5 years
- (c) $\mu = 7.5$ years
- (d) $p = 0.5$
- (e) None of the above

7. Define hypotheses.

- (a) $H_A: \mu \neq 7.2$ (b) $H_A: p \neq 0.5$ (c) $H_A: \mu \neq 7.5$
 $H_0: \mu = 7.2$ $H_0: p = 0.5$ $H_0: \mu = 7.5$
- (d) $H_A: \mu = 7.2$ (e) $H_A: \mu < 7.5$
 $H_0: \mu \neq 7.2$ $H_0: \mu \geq 7.5$

8. Find the P -value.

- (a) $0 < P\text{-value} < .01$
- (b) $.01 < P\text{-value} < .05$
- (c) $.05 < P\text{-value} < .10$
- (d) $.10 < P\text{-value} < .20$
- (e) $P\text{-value} > .20$

9. Make a decision.

- (a) Reject H_0 since $P\text{-value} \leq .10 = \alpha$.
- (b) Reject H_0 since $P\text{-value} > .10 = \alpha$.
- (c) Fail to reject H_0 since $P\text{-value} \leq .10 = \alpha$.
- (d) Fail to reject H_0 since $P\text{-value} > .10 = \alpha$.
- (e) None of the above

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10. Interpret for a client.

- (a) There is sufficient evidence to conclude that the average period for postal service employment has changed compared to 20 years ago.
- (b) There is sufficient evidence to conclude that the average period for postal service employment has not changed compared to 20 years ago.
- (c) There is insufficient evidence to conclude that the average period for postal service employment has changed compared to 20 years ago.
- (d) There is insufficient evidence to conclude that the average period for postal service employment has not changed compared to 20 years ago.
- (e) None of the above

11. Suppose that the sample average and standard deviation in this problem were based on a sample of 50 postal employees instead of 112 postal employees. Then the P -value would be

- (a) larger
- (b) smaller
- (c) unchanged since the difference between \bar{x} and μ_0 is unchanged.
- (d) unchanged since the variability measured by the standard deviation remains the same.

Questions 12–16.

An inspector for a potato chip company inspects truckloads of potatoes for defective potatoes. The potato chip company will pay for a truckload only if the inspector finds clear evidence at the 1% significance level that fewer than 10% of potatoes in the truckload are defective. (Otherwise, the company refuses to pay for the truckload.)

Suppose that the inspector randomly selects 150 potatoes from the 3014 potatoes contained in a particular truckload. If only 6 of the sampled potatoes are defective, will the company pay for the truckload?

(Use at least 4 decimal places accuracy in calculations.)

12. Define the parameter.

- (a) p = proportion of defective potatoes in all truckloads which are inspected
- (b) p = proportion of defective potatoes in the particular truckload being inspected
- (c) \hat{p} = proportion of defective potatoes in all truckloads which are inspected
- (d) \hat{p} = proportion of defective potatoes in the particular truckload being inspected
- (e) None of the above

13. Define hypotheses.

- (a) $H_A: \hat{p} \geq .10$ (b) $H_A: p \geq .10$ (c) $H_A: p < .10$
 $H_0: \hat{p} < .10$ $H_0: p < .10$ $H_0: p \geq .10$
- (d) $H_A: p < .04$ (e) $H_A: p \leq .04$
 $H_0: p \geq .04$ $H_0: p > .04$

14. Find the P -value.

- (a) ≈ 0
- (b) .0071
- (c) .0142
- (d) .9929
- (e) ≈ 1

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15. Make a decision.

- (a) Reject H_0 since $P\text{-value} \leq \alpha$.
- (b) Reject H_0 since $P\text{-value} > \alpha$.
- (c) Fail to reject H_0 since $P\text{-value} \leq \alpha$.
- (d) Fail to reject H_0 since $P\text{-value} > \alpha$.

16. Which of the following is implied?

- (a) The company will pay for the truckload.
- (b) The company will not pay for the truckload.
- (c) The company will possibly, but not definitely, pay for the truckload.
- (d) None of the above

Exam 1 Formula Sheet

Confidence Intervals

$$\bar{x} \pm t^* \frac{s}{\sqrt{n}} \quad \hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Hypothesis Tests

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} \quad Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

Two Populations

$$(\hat{p}_1 - \hat{p}_2) \pm z^* \sigma_{\hat{p}_1 - \hat{p}_2}$$

$$\sigma_{\hat{p}_1 - \hat{p}_2} \approx \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

$$Z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\left(\frac{1}{n_1} + \frac{1}{n_2}\right) \hat{p}(1-\hat{p})}}$$

$$\hat{p} = \frac{x_1 + x_2}{n_1 + n_2}$$

Solution

1. a
2. b
3. a
4. c
5. e $\mu = 2.36$ and $\bar{x} = 2.5$ are both correct equations.
6. e $\mu =$ average period (in years) for postal service employment currently
7. c
8. d
9. d
10. c
11. a
12. b
13. c
14. b
15. a
16. a