

**Stats for Strategy Spring 2012**  
**Exam 1 In-Class Practice Questions**  
**Friday Feb. 3, 2012**

**Directions:** The exam format is multiple choice. Choose the single best answer for each question. Discuss your answers during today's class with classmates, TA's and Professor Whitten. Check your answers later on the Exams page of the course website. (Additional practice questions are also available on the website.) The actual exam includes approximately 25 questions, tables and a formula sheet.

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

**Questions 1–2.**

1. Suppose that the  $P$ -value for a hypothesis test is

$$P\text{-value} = .2610$$

The interpretation is

- (a) There is a 26.10% risk of error if the alternative hypothesis  $H_A$  is accepted on the basis of the sample (or stronger) evidence, assuming that  $H_A$  is true.
  - (b) There is a 26.10% chance that the alternative hypothesis is true.
  - (c) The maximum tolerated risk of error in this hypothesis test is 26.10%.
  - (d) There is a 26.10% risk of error if the null hypothesis  $H_0$  is rejected on the basis of the sample (or stronger) evidence, assuming that  $H_0$  is true.
  - (e) None of the above.
2. Why are confidence intervals used to make inferences?
- (a) There is almost no chance that estimates such as  $\bar{x}$  and  $\hat{p}$  are correct unless we combine them with margins of error.
  - (b) Confidence interval formulas are valid regardless of sample size.
  - (c) The values of population parameters  $\mu$  and  $p$  vary, depending on sample measurements.
  - (d) Using confidence intervals is the only way to answer specific questions about parameters.
  - (e) Using confidence intervals is the only way to answer specific questions about statistics.

**Questions 3–7.**

A recent poll of UI students conducted by the Daily Iowan newspaper found that 432 out of 642 respondents disagreed with U.S. policy in Iraq, while the remainder agreed with U.S. policy in Iraq. Is it true that the fraction of all UI students who agree with U.S. policy in Iraq differs from one-third? Use  $\alpha = .10$ . (Use at least 4 decimal places accuracy in calculations.)

3. Define the parameter.

- (a)  $p$  = proportion of UI students surveyed who agree with U.S. policy in Iraq
- (b)  $\hat{p}$  = proportion of UI students surveyed who agree with U.S. policy in Iraq
- (c)  $\mu$  = average number of UI students who agree with U.S. policy in Iraq
- (d)  $\mu$  = percentage of UI students who agree with U.S. policy in Iraq
- (e) None of the above

4. Define hypotheses.

- (a)  $H_A: p < 1/3$   
 $H_0: p \geq 1/3$
- (b)  $H_A: \mu \neq 1/3$   
 $H_0: \mu = 1/3$
- (c)  $H_A: p \neq 1/3$   
 $H_0: p = 1/3$
- (d)  $H_A: p = 1/3$   
 $H_0: p \neq 1/3$
- (e)  $H_A: \hat{p} = .6729$   
 $H_0: \hat{p} \neq .6729$

5. Find the  $P$ -value.

- (a) .3333    (b) .3707    (c) .6293    (d) .6667
- (e) None of the answers is correct to the fourth decimal place.

6. Make a decision.

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

7. Give an English interpretation.

- (a) There is insufficient evidence to show that the fraction of all UI students who agree with U.S. policy in Iraq is one-third.
- (b) There is insufficient evidence to show that more than one-third of all UI students agree with U.S. policy in Iraq.
- (c) There is sufficient evidence to show that the fraction of all UI students who agree with U.S. policy in Iraq differs from one-third.
- (d) There is insufficient evidence to show that the fraction of all UI students who agree with U.S. policy in Iraq differs from one-third.
- (e) None of the answers is correct.

### Questions 8–10.

A hypothesis test

$$H_A: \mu > 36$$

$$H_0: \mu \leq 36$$

based on a sample of 26 measurements resulted in the statistics  $\bar{x} = 34.3$  and  $t = -1.526$ . Use a significance level  $\alpha = 0.10$  for the test. Consider the following MINITAB steps and output:

```
Calc > Probability Distributions > t > (Select "Cumulative probability")  
> (Input Degrees of freedom: 25) > (Input constant -1.526) > OK
```

Cumulative Distribution Function	
Student's t distribution with 25 DF	
x	P(X<=x)
-1.526	0.0697814

8. Find the  $P$ -value for the hypothesis test, rounded to 2 decimal places.

- (a) 0.07   (b) 0.93   (c) 0.14   (d) 0.86   (e) None of the answers is correct.

(Hint: You used similar MINITAB commands in the First-Week Discussion Handout. The notation " $P(X \leq x)$ " indicates that MINITAB shades the  $t$ -curve in which direction?)

9. Make a decision.

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

10. Which of the following statements most accurately describes the summary sample evidence in this problem?

- (a) There is some evidence against the null hypothesis  $H_0$ , but not enough to reject  $H_0$ .  
(b) There is sufficient evidence against  $H_0$  to reject  $H_0$ .  
(c) There is no sample evidence against  $H_0$ .  
(d) There is no way to determine whether there is any sample evidence against  $H_0$ .

**Questions 11–16.**

Money worries in the United States start at an early age. In a survey, 660 children (330 boys and 330 girls) ages 6 to 14 were asked the question “Do you worry about having enough money?” Of the boys surveyed, 201 answered yes. Of the girls surveyed, 152 answered no. At a 1% significance level, is the proportion of boys who worry about having enough money greater than the corresponding proportion of girls?

A colleague has run MINITAB for you in reference to this question, with output as shown below.

**Test and CI for Two Proportions**

Sample	X	N	Sample p
1	201	330	0.609091
2	152	330	0.460606

Difference = p (1) - p (2)

Estimate for difference: 0.148485

95% lower bound for difference: 0.0853262

Test for difference = 0 (vs > 0): Z = 3.82 P-Value = 0.000

**Test and CI for Two Proportions**

Sample	X	N	Sample p
1	201	330	0.609091
2	152	330	0.460606

Difference = p (1) - p (2)

Estimate for difference: 0.148485

95% CI for difference: (0.0732267, 0.223743)

Test for difference = 0 (vs not = 0): Z = 3.82 P-Value = 0.000

11. Define parameters for this problem.

- (a)  $p_1$  = proportion of boys who worry about money  
 $p_2$  = proportion of girls who worry about money
- (b)  $\mu_1$  = average number of boys who worry about money  
 $\mu_2$  = average number of girls who worry about money
- (c)  $p_1$  = average number of boys who worry about money  
 $p_2$  = average number of girls who worry about money
- (d)  $p_1$  = proportion of children ages 6 to 14 who are boys  
 $p_2$  = proportion of children ages 6 to 14 who are girls

12. Define hypotheses.

- (a)  $H_A: \mu_1 > \mu_2$   
 $H_0: \mu_1 \leq \mu_2$
- (b)  $H_A: p_1 < p_2$   
 $H_0: p_1 \geq p_2$
- (c)  $H_A: p_1 \neq p_2$   
 $H_0: p_1 = p_2$
- (d)  $H_A: p_1 > p_2$   
 $H_0: p_1 \leq p_2$
- (e) None of the definitions is correct.

13. Find the  $P$ -value.

- (a) 0.000    (b) 0.035    (c) 0.070    (d) 1.000    (e) 1.035

14. What is the decision?

- (a) Reject  $H_0$ .
- (b) Fail to reject  $H_0$ .
- (c) Impossible to determine.

15. What is the interpretation?

- (a) There is sufficient evidence to show that the percentage of boys who worry about money differs from the percentage of girls who worry about money.
- (b) There is insufficient evidence to show that the percentage of boys who worry about money differs from the percentage of girls who worry about money.
- (c) There is sufficient evidence to show that the percentage of boys who worry about money is greater than the percentage of girls who worry about money.
- (d) There is insufficient evidence to show that the percentage of boys who worry about money is greater than the percentage of girls who worry about money.
- (e) None of the answers is correct.

16. Interpret a 95% confidence interval for this problem. We are 95% confident that

- (a) between 7.3% fewer and 22.4% more boys than girls worry about money.
- (b) between 4.6% and 9.8% more boys than girls worry about money.
- (c) between 7.3% and 22.4% fewer boys than girls worry about money.
- (d) between 0.6% fewer and 14.5% more boys than girls worry about money.
- (e) between 7.3% and 22.4% more boys than girls worry about money.

Answers

1. d

2. a

3. e  $p$  = proportion of all UI students who agree with U.S. policy in Iraq

4. c

5. e  $P$ -value = .7414

6. d

7. d

8. b

9. b

10. c

There is NO summary sample evidence against  $H_0: \mu \leq 36$  since the sample mean is itself less than 36:  $\bar{x} = 34.3 < 36$ .

11. a

12. d

13. b

The boys' data and girls' data were entered into MINITAB inconsistently (such that "yes" for boys means "no" for girls.) This is such a serious mistake that MINITAB output for this problem is useless. All calculations must be done by hand.

14. b

15. d

16. d