Dr. ZABDAWI Practice problems for chapter 8 6/20/11

Name Solution Key

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Express the null hypothesis H_0 and the alternative hypothesis H_1 in symbolic form. Use the correct symbol (μ, p, σ)for the indicated parameter.

1) An entomologist writes an article in a scientific journal which claims that fewer than 11 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Use the parameter p, the true proportion of fireflies unable to produce light. 1) A

A) H_0: $p = 0.0011$ H_1: $p < 0.0011$
B) H_0: $p > 0.0011$ H_1: $p \le 0.0011$
C) H_0: $p < 0.0011$ H_1: $p \ge 0.0011$
D) H_0: $p = 0.0011$ H_1: $p > 0.0011$

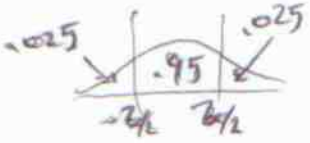
2) A researcher claims that 62% of voters favor gun control. 2) B

A) H_0: $p \ge 0.62$ H_1: $p < 0.62$
B) H_0: $p = 0.62$ H_1: $p \ne 0.62$
C) H_0: $p < 0.62$ H_1: $p \ge 0.62$
D) H_0: $p \ne 0.62$ H_1: $p = 0.62$

Assume that the data has a normal distribution and the number of observations is greater than fifty. Find the critical z value used to test a null hypothesis.

3) $\alpha = 0.05$ for a two-tailed test. 3) D

A) ±1.645 B) ±1.764 C) ±2.575 D) ±1.96



$z_{critical} = z_{\alpha/2} = 1.96$

$-z_{\alpha/2} = -1.69$ = Invnorm(.025)

Find the value of the test statistic z using $z = \dfrac{\hat{p} - p}{\sqrt{\dfrac{pq}{n}}}$.

4) A claim is made that the proportion of children who play sports is less than 0.5, and the sample statistics include n = 1158 subjects with 30% saying that they play a sport. 4) B

A) 27.78 B) -13.61 C) -27.78 D) 13.61

$H_0: P = 0.5$ | $n = 1158$
$H_1: P < 0.5$ | $\hat{P} = 0.3 \Rightarrow x = 0.3 \times 1158 \approx 347$

$Z_{test} = \dfrac{\hat{P} - P}{\sqrt{\dfrac{P(1-P)}{n}}} = \dfrac{(0.3 - 0.5)}{\sqrt{\dfrac{.5(1-.5)}{1158}}} = -13.61$

Use the given information to find the P-value.

5) The test statistic in a right-tailed test is z = 0.52. 5) B

A) 0.1915 B) 0.3015 C) 0.1950 D) 0.5530

P-value = normalcdf(0.52, 1E99)
= .3015

$H_0: P = .0019$
$H_1: P < .0019$

Formulate the indicated conclusion in nontechnical terms. Be sure to address the original claim.

6) An entomologist writes an article in a scientific journal which claims that fewer than 19 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is to reject the null hypothesis, state the conclusion in nontechnical terms. 6) C

A) There is sufficient evidence to support the claim that the true proportion is greater than 19 in ten thousand.

B) There is not sufficient evidence to support the claim that the true proportion is greater than 19 in ten thousand.

C) There is sufficient evidence to support the claim that the true proportion is less than 19 in ten thousand.

D) There is not sufficient evidence to support the claim that the true proportion is less than 19 in ten thousand.

Assume that a hypothesis test of the given claim will be conducted. Identify the type I or type II error for the test.

7) An entomologist writes an article in a scientific journal which claims that fewer than 16 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Identify the type I error for the test. 7) A

A) The error of rejecting the claim that the true proportion is at least 16 in ten thousand when it really is at least 16 in ten thousand.

B) The error of failing to reject the claim that the true proportion is at least 16 in ten thousand when it is actually less than 16 in ten thousand.

C) The error of rejecting the claim that the true proportion is less than 16 in ten thousand when it really is less than 16 in ten thousand.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.

8) A manufacturer considers his production process to be out of control when defects exceed 3%. In a random sample of 85 items, the defect rate is 5.9% but the manager claims that this is only a sample fluctuation and production is not really out of control. At the 0.01 level of significance, test the manager's claim. 8) _____

$H_0: P = .03$
$H_a: P > .03$
$n = 85$
$\bar{P} = .059$

$z_{test} = \frac{(.059 - .03)}{\sqrt{\frac{.03 \times .97}{85}}}$

$z_{test} = 1.57$ ⇒ Fail to Reject H_0
⇒ Fail to Support H_a

Pvalue = normalcdf(1.57, 1E99)
= .0582 > .01

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the P-value for the indicated hypothesis test.

9) A manufacturer claims that fewer than 6% of its fax machines are defective. In a random sample of 97 such fax machines, 5% are defective. Find the P-value for a test of the manufacturer's claim. 9) D

A) 0.3264 B) 0.1736 C) 0.1591 D) 0.3409

$H_0: P = .06$
$H_1: P < .06$
$\bar{P} = .05, n = 97$

$z_{test} = \frac{(.05 - .06)}{\sqrt{\frac{.06(1-.06)}{97}}} = -.41$

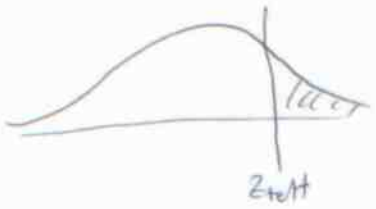
P-value = normalcdf(-1E99, -.41)
= .3409

10) A medical school claims that more than 28% of its students plan to go into general practice. It is found that among a random sample of 130 of the school's students, 32% of them plan to go into general practice. Find the P-value for a test of the school's claim. 10) C

A) 0.3461 B) 0.3078 C) 0.1539 D) 0.1635

$H_0: P = 0.28$

$H_a: P > 0.28$



$n = 130$
$\bar{P} = 0.32$
$\Rightarrow z_{test} = \dfrac{\bar{P} - P}{\sqrt{\frac{P(1-P)}{n}}}$

$z_{test} = \dfrac{(0.32 - 0.28)}{\sqrt{\frac{.28(1-.28)}{130}}} = 1.0157 \approx 1.02$

Pvalue = normalcdf(1.02, 1E99)

= .1539