4.2 & 4.3 review

Name_____

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

Select the most appropriate answer.

1) The p-value is 1) _____

A) the probability that the null hypothesis is true..
B) the probability, when the null hypothesis is true, of obtaining a sample as extreme as (or more extreme than) the observed sample.
C) the probability that the alternative hypothesis is true.
D) the probability, when the alternative hypothesis is true, of obtaining a sample as extreme as (or more extreme than) the observed sample.

2) Which of the following statements is false? 2) _____

A) The smaller the P-value, the stronger the evidence is against H_0.
B) The P-value is between 0 and 1.
C) The P-value assumes H_a is true.
D) The P-value is the probability, when the null hypothesis is true, of obtaining a sample as extreme as (or more extreme than) the observed sample.

3) Which P-value provides the strongest evidence against the null hypothesis? 3) _____

A) 0.001 B) 0.05 C) 0.5 D) 1 E) 0.99

4) It is of interest to test the hypotheses H_0: $p = 0.8$ versus H_a: $p < 0.8$. The sample outcome, based on n = 10 observations, is $\hat{p} = 0.7$, and the randomization statistic to be calculated is $\hat{p}$, The p-value for this test was found to be 0.322. If the test was performed correctly, where should the randomization distribution be centered? 4) _____

A) 0.7 B) 10 C) 0.322 D) 0.8 E) 0.050

As of August 8, 2012, the national average price for a gallon of regular unleaded gasoline was $3.63. The prices for a sample of $n = 10$ gas stations in the state of Illinois are provided: $3.759 $3.919 $3.859 $4.099 $4.299 $4.309 $3.999 $4.099 $3.749 $3.659

5) Define the appropriate parameter(s) and state the hypotheses for testing if this sample provides evidence that the average gas price in Illinois exceeds the national average. 5) _____

A) $H_0: \mu = 3.63$ $H_a: \mu < 3.63$
B) $H_0: \mu = 3.63$ $H_a: \mu \geq 3.63$
C) $H_0: \mu = 3.63$ $H_a: \mu > 3.63$
D) $H_0: \mu = 3.63$ $H_a: \mu \neq 3.63$

6) Indacited weather the test is a left-tail test, a right-tail test, or a two-tailed test. 6) _____

A) left-tail test B) right-tail test C) two-tailed test D) None of these

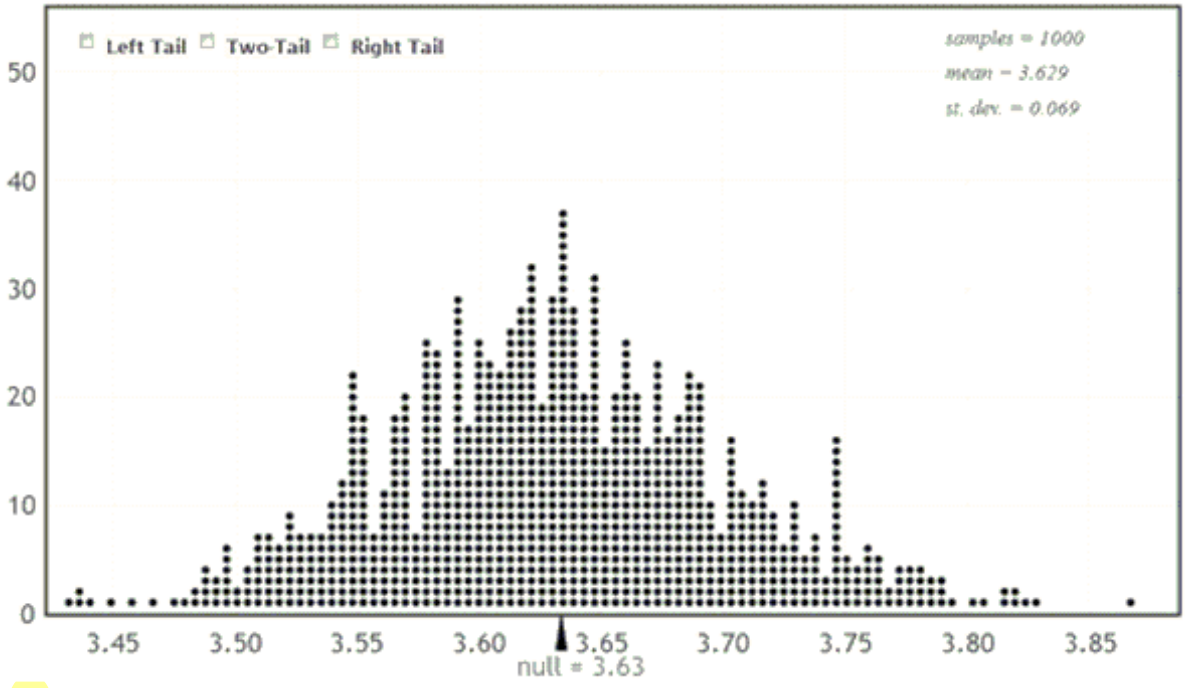
7) Identify (using the appropriate notation) the sample statistic you would record for each sample. 7) _____

A) μ B) $\hat{p}$ C) p D) $\bar{x}$

8) identify the sample statistic based on the original sample 8) _____

A) $\bar{x} = 3.975$ B) $\bar{x} = 3.63$ C) $\mu = 3.975$ D) $\mu = 3.63$

9) Use the provided randomization distribution (based on 1,000 samples) to estimate the p-value for this sample. 9) _____



A) 0 B) *0.05* C) 0.12 D) 0.78

10) Use your p-value to make a decision about these hypotheses using $\alpha = 0.05$. Be sure to word your decision in the context of the problem. Include an assessment of the strength of your evidence. 10) _____

A) Reject H_0, This p-value provides weak evidence that the average gas price in Illinois is greater than 3.63 (the national average)..

B) Do not reject H_0,This p-value provides no evidence that the average gas price in Illinois is greater than 3.63 (the national average).

C) Reject H_0, This p-value provides mild evidence that the average gas price in Illinois is greater than 3.63 (the national average).

D) Do not reject H_0, we cannot conclude that the average gas price in Illinois is greater than 3.63 (the national average).

E) Reject H_0. This p-value provides very strong evidence that the average gas price in Illinois is greater than 3.63 (the national average).

A student in an introductory statistics course investigated if there is evidence that the proportion of milk chocolate M&M's that are green differs from the proportion of dark chocolate M&M's that are green. She purchased a bag of each variety, and her data are summarized in the following table.

	Green	Not Green	Total
Milk Chocolate	8	33	41
Dark Chocolate	4	38	42
Total	12	71	83

11) Define the appropriate parameter(s) and state the hypotheses for testing the proportion of milk chocolate M&M's that are green differs from the proportion of dark chocolate 11) _____

A) H_0: $p_{m.c.} = p_{d.c.}$
H_a: $p_{m.c.} > p_{d.c.}$

B) H_0: $p_{m.c.} = p_{d.c.}$
H_a: $p_{m.c.} < p_{d.c.}$

C) H_0: $p_{m.c.} \neq p_{d.c.}$
H_a: $p_{m.c.} = p_{d.c.}$

D) H_0: $p_{m.c.} = p_{d.c.}$
H_a: $p_{m.c.} \neq p_{d.c.}$

12) Indacited weather the test is a left-tail test, a right-tail test, or a two-tailed test. 12) _____

A) left-tail test B) right-tail test C) two-tailed test D) None of these

13) identify (using the appropriate notation) the sample statistic you would record for each sample. 13) _____

A) $\bar{x}_{m.c} - \bar{x}_{d.c}$ B) $p_{m.c} - p_{d.c}$ C) $\mu_{m.c} - \mu_{d.c}$ D) $\hat{p}_{m.c} - \hat{p}_{d.c}$

14) identify the sample statistic based on the original sample 14) _____

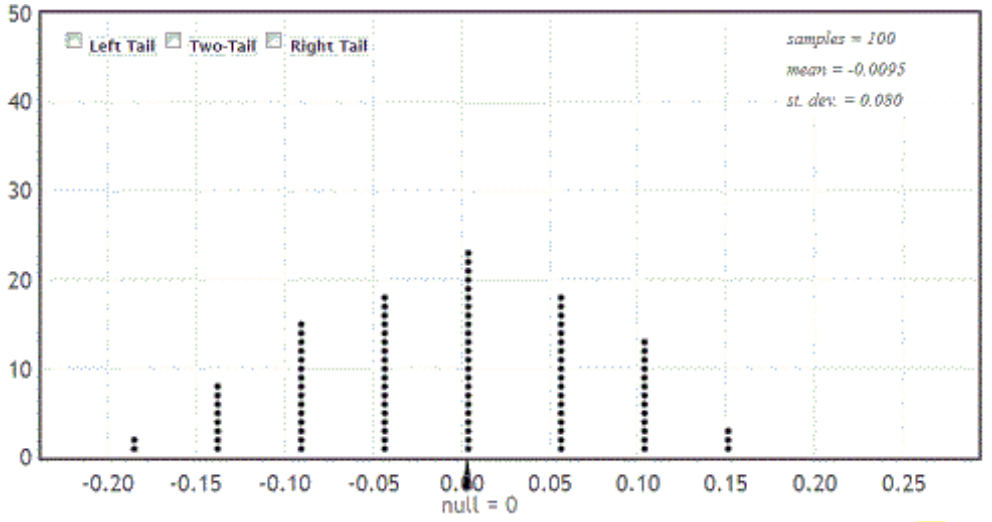
A) $p_{m.c} - p_{d.c} = 0.10$

B) $\hat{p}_{m.c} - \hat{p}_{d.c} = 0.10$

C) $\hat{p}_{m.c} - \hat{p}_{d.c} = 0.05$

D) $p_{m.c} - p_{d.c} = 0.05$

15) Use the provided randomization distribution (based on 100 samples) to test if this sample provides evidence that the proportion of candies that are green differs for the two types of M&M's. Include an assessment of the strength of your evidence. 15) _____



A) 0.06 B) *0.10* C) 0.16 D) 0.32

16) Use your p-value to make a decision about these hypotheses using $\alpha = 0.05$. Be sure to word your decision in the context of the problem. Include an assessment of the strength of your evidence. 16) _____

A) Do not reject H_0, this p-value provides evidence that the proportion of green candies differs for milk chocolate and dark chocolate M&M's.

B) Reject H_0, this p-value provides evidence that the proportion of green candies differs for milk chocolate and dark chocolate M&M's.

C) Reject H_0, this p-value provides no evidence that the proportion of green candies differs for milk chocolate and dark chocolate M&M's.

D) Do not reject H_0, this p-value provides no evidence that the proportion of green candies differs for milk chocolate and dark chocolate M&M's.

Match each p-value to the most appropriate conclusion.

17) The evidence against the null and in favor of the alternative is very strong. 17) _____

A) 0.07 B) 0.04 C) 0.65 D) 0.0001

18) The result is significant at the 5% level but not at a 1% level. 18) _____

A) 0.04 B) 0.65 C) 0.07 D) 0.0001

19) There is really no evidence supporting the alternative hypothesis 19) _____

A) 0.07 B) 0.65 C) 0.0001 D) 0.04

20) The evidence against the null is significant, but only at the 10% level 20) _____

A) 0.65 B) 0.04 C) 0.0001 D) 0.07

A study examines whether giving antibiotics in infancy increases the likelihood that the child will be overweight later in life. Prescription records were examined to determine whether or not antibiotics were prescribed during the first year of a child's life, and each child was classified as overweight or not at age 12. The researchers compared the proportion overweight in each group. The study concludes that: "Infants receiving antibiotics in the first year of life were more likely to be overweight later in childhood compared with those who were unexposed (32.4% versus 18.2% at age 12, P-value=0.002)." using $\alpha = 0.05$

Let group 1 be the children who have been given antibiotics and let group 2 be the children who have not been given antibiotics.

21) What is the explanatory variable? 21) _____

A) Whether or not infants received antibiotics during the first year of life.

B) Whether or not the child was classified as overweight at age 12.

22) Is the explanatory variable categorical or quantitative? 22) _____

A) Categorical B) Quantitative.

23) What is the response variable? 23) _____

A) Whether or not the child was classified as overweight at age 12.

B) Whether or not infants received antibiotics during the first year of life

24) Is the response variable categorical or quantitative? 24) _____

A) Categorical B) Quantitative.

25) Is this an experiment or an observational study? 25) _____

A) Observational study B) Experiment

26) Define the appropriate parameter(s) and state the hypotheses for testing . 26) _____

A) $H_0: p_1 = p_2$ $H_a: p_1 \geq p_2$

B) $H_0: p_1 = p_2$ $H_a: p_1 > p_2$

C) $H_0: p_1 = p_2$ $H_a: p_1 < p_2$

D) $H_0: p_1 = p_2$ $H_a: p_1 \neq p_2$

27) Give the notation for the sample statistic. 27) _____

A) $\mu_1 - \mu_2$ B) $\bar{x}_1 - \bar{x}_2$ C) $\hat{p}_1 - \hat{p}_2$ D) $p_1 - p_2$

28) What is the value of the sample statistic? 28) _____

A) 0.182 B) 0.324 C) 0.002 D) 0.142

29) Use the p-value to make a decision about these hypotheses using $\alpha = 0.05$ 29) _____

A) Reject H0. B) Do not reject H0.

30) Can we conclude that whether or not children receive antibiotics in infancy causes the difference in proportion classified as overweight? 30) _____

A) No B) Yes

Does consuming beer attract mosquitoes? An experiment was done in Africa to test possible ways to reduce the spread of malaria by mosquitoes. In the experiment, 43 volunteers were randomly assigned to consume either a liter of beer or a liter of water, and the attractiveness to mosquitoes of each volunteer was measured. The experiment was designed to test whether beer consumption increases mosquito attraction. The report states that "Beer consumption, as opposed to water consumption, significantly increased the activation(P<0.001)".

31) Is this convincing evidence that consuming beer is associated with higher mosquito attraction? 31) _____

A) Yes B) No

32) How strong is the evidence for the result? 32) _____

A) There is no evidence at all. Results are not significant.
B) There is mild evidence.
C) There is strong evidence.
D) There is no evidence.

33) Based on these results, it is reasonable to conclude that consuming beer causes an increase in mosquito attraction? 33) _____

A) Yes B) No