

800:072 01  
WORK ALONE

**TEST**

NAME: \_\_\_\_\_  
17 NO 06

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*SHOW APPROPRIATE WORK*

Four pages — point values in margin — 100 points total

**Choose the best (closest) answer to each question.**

- (5) 1. If  $X$  is normally distributed with  $\sigma = 12$  and  $\bar{x} = 20$  based on a sample of size  $n = 35$ , what is the 95% confidence interval for the mean?
- (a) (17.40, 22.60)  
(b) (16.65, 23.35)  
(c) (16.45, 23.55)  
(d) (16.02, 23.98)  
(e) (15.84, 24.16)
- (5) 2. If  $\hat{p} = .80$  based on a sample of size  $n = 70$ , what is the 98% confidence interval for  $p$ ? (recall:  $\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$ )
- (a) (.721, .879)  
(b) (.716, .884)  
(c) (.706, .894)  
(d) (.702, .898)  
(e) (.689, .911)
- (5) 3. If  $\sigma = 36$  and  $\bar{x} = 60$  based on a sample of size  $n = 49$ , what is the level of confidence for the confidence interval for the mean (50, 70)?
- (a) .78  
(b) .89  
(c) .93  
(d) .95  
(e) .97
- (5) 4. If  $\sigma = 36$ , how large must  $n$  be to provide a 99% confidence interval of radius less than or equal to 3 (length  $\leq 6$ )?
- (a) 6  
(b) 7  
(c) 31  
(d) 959  
(e) 1705
- (5) 5. If the sample size is doubled but the level of confidence remains the same, the radius of the confidence interval (margin of error) will
- (a) be halved.  
(b) decrease, but not by a factor of two.  
(c) remain the same.  
(d) increase, but not by a factor of two.  
(e) double.

- (5) 6. If  $\bar{x} = 18$  based on a sample of size 64, you would reject the null hypothesis  $\mu = 15$  and  $\sigma = 14$  (versus  $H_A : \mu \neq 15$ )
- (a) at the 1% level, but not the 5% level.
  - (b) at the 5% level, but not the 1% level.
  - (c) at the 5% level, but not the 10% level.
  - (d) at the 10% level, but not the 5% level.
  - (e) None of the above are true.
- (5) 7. If  $\bar{x} = 18$  based on a sample of size 64, you would reject the null hypothesis  $\mu = 15$  and  $\sigma = 14$  (versus  $H_A : \mu < 15$ )
- (a) at the 1% level, but not the 5% level.
  - (b) at the 5% level, but not the 1% level.
  - (c) at the 5% level, but not the 10% level.
  - (d) at the 10% level, but not the 5% level.
  - (e) None of the above are true.
- (5) 8. If  $\bar{x} = 18$  based on a sample of size 64, you would reject the null hypothesis  $\mu = 15$  and  $\sigma = 14$  (versus  $H_A : \mu > 15$ )
- (a) at the 1% level, but not the 5% level.
  - (b) at the 5% level, but not the 1% level.
  - (c) at the 5% level, but not the 10% level.
  - (d) at the 10% level, but not the 5% level.
  - (e) None of the above are true.
- (5) 9. If a politician claims that a majority (at least 50%) of the voters approve of his record, but only 100 out of 227 voters in a survey agree with him, you question his assertion
- (a) at the 1% level, but not the 5% level.
  - (b) at the 5% level, but not the 1% level.
  - (c) at the 5% level, but not the 10% level.
  - (d) at the 10% level, but not the 5% level.
  - (e) None of the above are true.
- (5) 10. If the null hypothesis is that  $X$  is normally distributed with mean  $\mu = 18$  and standard deviation  $\sigma = 9$  ( $H_A : \mu \neq 18$ ), but you find  $\bar{x} = 20$  based on a sample of size 49, at what level is this significant?
- (a) 1.5%
  - (b) 3%
  - (c) 6%
  - (d) 9%
  - (e) 12%

- (5) 11. If the 95% confidence interval contains the hypothesized mean, then
- you reject the null hypothesis at the 5% significance level.
  - you fail to reject the null hypothesis at the 5% significance level.
  - you reject the null hypothesis at the 95% significance level.
  - you fail to reject the null hypothesis at the 95% significance level.
  - you have no information relevant to rejecting the null hypothesis.
- (5) 12. When testing the null hypothesis that the jelly beans in a bag were randomly chosen from a supply which had equal amounts of lemon, lime, cherry, grape, orange, strawberry, coconut, and licorice jelly beans ( $\frac{1}{8}$  each), a value of 13 for  $X^2$  is calculated. You would reject the null hypothesis of equal frequencies
- at the 1% level, but not the 5% level.
  - at the 5% level, but not the 1% level.
  - at the 5% level, but not the 10% level.
  - at the 10% level, but not the 5% level.
  - None of the above are true.
- (5) 13. If you calculate a negative value for  $X^2$  when performing a goodness of fit test, then
- you suspect your hypothesized frequencies were wrong.
  - you suspect your sample was not random.
  - you suspect the data was not normally distributed.
  - your sample was not large enough.
  - you made a computational error.
- (5) 14. If you find 15 limes, 25 lemons, and 40 oranges, what is the value of  $X^2 = \sum \frac{(o_i - e_i)^2}{e_i}$  which you calculate to test the hypothesis that the relative proportions are 25%, 25%, and 50%, respectively.
- 2
  - 2.5
  - 3.125
  - 6
  - 7.5
- (5) 15. The observed numbers of Assyrian, Babylonian, and Chaldean men, women, boys, and girls are given in the table below. What is the expected number of Assyrian boys that should be used for testing independence of age-gender and nationality?
- |       |    |    |    |
|-------|----|----|----|
|       | A  | B  | C  |
| men   | 29 | 57 | 33 |
| women | 17 | 54 | 45 |
| boys  | 12 | 15 | 29 |
| girls | 10 | 30 | 25 |
- 10.70
  - 13.46
  - 24.10
  - 25.93
  - 29.67

- (5) 16. The observed numbers of Assyrian, Babylonian, and Chaldean men, women, boys, and girls are given in the table below. How many degrees of freedom does the test of independence of age-gender and nationality have?
- |       | A  | B  | C  |
|-------|----|----|----|
| men   | 29 | 57 | 33 |
| women | 17 | 54 | 45 |
| boys  | 12 | 15 | 29 |
| girls | 10 | 30 | 25 |
- (a) 2  
 (b) 5  
 (c) 6  
 (d) 7  
 (e) 12
- (5) 17. If John constructs a 95% confidence interval based on his data which is identical to a 99% confidence interval which Karen constructs based on her data (both use the same standard deviation  $\sigma$ ),
- (a) both found the same value for  $\bar{x}$ , but their sample sizes ( $n$ ) were different.  
 (b) both had the same sample size ( $n$ ), but their values for  $\bar{x}$  were different.  
 (c) both had the same value for  $\bar{x}$  and the same sample size ( $n$ ).  
 (d) their values for  $\bar{x}$  were different and their sample sizes ( $n$ ) were different.  
 (e) Their confidence intervals could not be identical.
- (5) 18. If the null hypothesis is that a person is healthy, a Type II error entails
- (a) diagnosing a healthy person as healthy.  
 (b) diagnosing a healthy person as diseased.  
 (c) diagnosing a diseased person as healthy.  
 (d) diagnosing a diseased person as diseased.  
 (e) not billing the patient.
- (5) 19. If you want to reduce the probability of a type II error,
- (a) you must decrease the level of significance of the test of the null hypothesis, which will result in increased type I error.  
 (b) you must decrease the level of significance of the test of the null hypothesis, which will result in decreased type I error.  
 (c) you must increase the level of significance of the test of the null hypothesis, which will result in increased type I error.  
 (d) you must increase the level of significance of the test of the null hypothesis, which will result in decreased type I error.  
 (e) The level of significance of the test of the null hypothesis does not affect type II error.
- (5) 20. Which of the following will increase with the discrepancy between observed and expected (hypothesized) values?
- (a) the P-value  
 (b)  $|z|$   
 (c)  $X^2$   
 (d) a and b  
 (e) b and c