8. Tamara Hill, fund manager of the Hill Value Fund, manages a portfolio of 250 common stocks. Tamara is searching for a 'low risk' issue to add to the portfolio, i.e., one with a price variance less than that of the S&P 500 index. Moreover, she assumes an issue is not 'low risk' until demonstrated otherwise. Her staff reported that during the last nine quarters the price variance for the S&P 500 index (population 1) was 25, and for the last seven quarters the price variance for XYC common (population 2) was 8. Assume that stock prices are normally distributed in the population. If $\alpha = 0.05$, what is the critical value for the appropriate test statistic?

a) 3.68
b) 3.58
c) 4.15
d) 3.29

9.Tamara Hill, fund manager of the Hill Value Fund, manages a portfolio of 250 common stocks. Tamara is searching for a 'low risk' issue to add to the portfolio, i.e., one with a price variance less than that of the S&P 500 index. Moreover, she assumes an issue is not 'low risk' until demonstrated otherwise. Her staff reported that during the last nine quarters the price variance for the S&P 500 index (population 1) was 25, and for the last seven quarters the price variance for XYC common (population 2) was 8. Assume that stock prices are normally distributed in the population. If $\alpha = 0.05$, what is the appropriate decision?

a) We have enough evidence to reject the null.

b) The difference between the two variances is statistically significant

c) We have enough evidence to claim that variances are not equal.

d) There is no significant difference between variances.

10. David Desreumaux, VP of Human Resources of American First Banks (AFB), is reviewing the employee training programs of AFB banks. Based on a recent census of personnel, David knows that the variance of teller training time in the Southeast region is 8, and he wonders if the variance in the Southwest region is the same number. His staff randomly selected personnel files for 15 tellers in the Southwest Region and determined that their mean training time was 25 hours and that the standard deviation was 4 hours. Assume that teller training time is normally distributed. If $\alpha = 0.05$, what is the appropriate test statistic and its formula?

a) t statistic

b) F statistic

c) Z statistic

d) Chi-square statistic

5.Tamara Hill, fund manager of the Hill Value Fund, manages a portfolio of 250 common stocks. Tamara is searching for a 'low risk' issue to add to the portfolio, i.e., one with a price variance less than that of the S&P 500 index. Moreover, she assumes an issue is not 'low risk' until demonstrated otherwise. Her staff reported that during the last nine quarters the price variance for the S&P 500 index (population 1) was 25, and for the last seven quarters the price variance for XYC common (population 2) was 8. Assume that stock prices are normally distributed in the population. If $\alpha = 0.05$, what is the appropriate test statistic?

a) t statistic

b) F statistic

c) Z statistic

d) Chi-square statistic

6.Tamara Hill, fund manager of the Hill Value Fund, manages a portfolio of 250 common stocks. Tamara is searching for a 'low risk' issue to add to the portfolio, i.e., one with a price variance less than that of the S&P 500 index. Moreover, she assumes an issue is not 'low risk' until demonstrated otherwise. Her staff reported that during the last nine quarters the price variance for the S&P 500 index (population 1) was 25, and for the last seven quarters the price variance for XYC common (population 2) was 8. Assume that stock prices are normally distributed in the population. If $\alpha = 0.05$, what are the degrees of freedom of the appropriate test statistic?

a) 8 and 6

b) 9 and 6

c) 7 and 5

d) 9 and 7

7.Tamara Hill, fund manager of the Hill Value Fund, manages a portfolio of 250 common stocks. Tamara is searching for a 'low risk' issue to add to the portfolio, i.e., one with a price variance less than that of the S&P 500 index. Moreover, she assumes an issue is not 'low risk' until demonstrated otherwise. Her staff reported that during the last nine quarters the price variance for the S&P 500 index (population 1) was 25, and for the last seven quarters the price variance for XYC common (population 2) was 8. Assume that stock prices are normally distributed in the population. If $\alpha = 0.05$, what is the observed value for the appropriate test statistics?

a) 3.13
b) 0.32
c) 1.77
d) 9.77

3. BigShots, Inc. is a specialty e-tailer that operates 87 catalog Web sites on the Internet. Kevin Conn, Sales Director, feels that the style (color scheme, graphics, fonts, etc.) of a Web site may affect its sales. He chooses three levels of design style (neon, old world and sophisticated) and randomly assigns six catalog Web sites to each design style. Analysis of Kevin's data yielded the following ANOVA table.

Source of Variation	SS	df	MS	F
Between Groups	A	2		
Within Groups	29177.67		1945.178	
Total	97280	17		

Using $\alpha = 0.05$, what is the value of "A" in the table?

a) 78102.33

b) 98102.33

c) 58102.33

d) 68102.33

4. BigShots, Inc. is a specialty e-tailer that operates 87 catalog Web sites on the Internet. Kevin Conn, Sales Director, feels that the style (color scheme, graphics, fonts, etc.) of a Web site may affect its sales. He chooses three levels of design style (neon, old world and sophisticated) and randomly assigns six catalog Web sites to each design style. Analysis of Kevin's data yielded the following ANOVA table.

Source of Variation	SS	df	MS	F
Between Groups		2		
Within Groups	29177.67	B	1945.178	
Total	97280	17		

Using $\alpha = 0.05$, what is the value of "B" in the table?

a) 17

b) 2

c) 15

d) 1

Section 1: Multiple Choice (60 points: Each question is worth 3 points)

1. BigShots, Inc. is a specialty e-tailer that operates 87 catalog Web sites on the Internet. Kevin Conn, Sales Director, feels that the style (color scheme, graphics, fonts, etc.) of a Web site may affect its sales. He chooses three levels of design style (neon, old world and sophisticated) and randomly assigns six catalog Web sites to each design style. Analysis of Kevin's data yielded the following ANOVA table.

Source of Variation	SS	df	MS	F
Between Groups		2		
Within Groups	29177.67		1945.178	
Total	97280	17		

Using $\alpha = 0.05$, the observed F value is _____.

a) 4.50
b) 10.13
c) 6.99
d) 17.51

2. BigShots, Inc. is a specialty e-tailer that operates 87 catalog Web sites on the Internet. Kevin Conn, Sales Director, feels that the style (color scheme, graphics, fonts, etc.) of a Web site may affect its sales. He chooses three levels of design style (neon, old world and sophisticated) and randomly assigns six catalog Web sites to each design style. Analysis of Kevin's data yielded the following ANOVA table.

Source of Variation	SS	df	MS	F
Between Groups		2		
Within Groups	29177.67		1945.178	
Total	97280	17		

Using $\alpha = 0.05$, the appropriate decision is _____.

a) do not reject the null hypothesis $\mu_1 = \mu_2 = \mu_3$
b) reject the null hypothesis $\mu_1 \neq \mu_2 \neq \mu_3$
c) reject the null hypothesis $\mu_1 \geq \mu_2 \geq \mu_3$
d) reject the null hypothesis $\mu_1 \leq \mu_2 \leq \mu_3$

Section 1: Multiple Choice (50 points):

Note: Use a pencil, not a pen, so in case you make a mistake, you can fix it. Y
change the answer sheet; the question will get zero credit if you pick multiple a

1) When testing for the difference between two population variances with sample
of $n_1 = 10$ and $n_2 = 12$, what is (are) the number (s) of degrees of freedom?

A) 10 and 12
B) 9 and 11
C) 22
D) 20

2) The statistical distribution that is used for testing the difference betwee
variances is the:

A) Student's t distribution.
B) standard normal distribution.
C) binomial distribution.
D) F distribution

3) A manager is considering the purchase of new production equip
the plant. Suppose the equipment from two suppliers is extensivel
runs. A total of 20 runs are recorded on Supplier A's equipment,
from Supplier B's equipment. The volume produced is recorded
results are summarized in the table below.

	Supplier A	Supplier B
Sample means	110	125
Sample standard deviation	10	15

The value of the test statistic for determining if there is a d
for Supplier A and B is equal to:

A) 0.44
B) 1.5
C) 2.25
D) 0.67

4) A manager is considering the purchase of new production equipment to improve the plant. Suppose the equipment from two suppliers is extensively tested in multi runs. A total of 20 runs are recorded on Supplier A's equipment, and another 15 ru from Supplier B's equipment. The volume produced is recorded for each of the 35 results are summarized in the table below.

	Supplier *A*	Supplier *B*
Sample means	110	125
Sample standard deviation	10	15

The numerator and denominator degrees of freedom associated with the test s determining if there is a difference in the population variances for Supplier *A* respectively:

A) 20 and 15.
B) 15 and 10.
C) 14 and 9.
D) 19 and 14.

5) A manager is considering the purchase of new production equipm the plant. Suppose the equipment from two suppliers is extensively runs. A total of 20 runs are recorded on Supplier A's equipment, an from Supplier B's equipment. The volume produced is recorded fo results are summarized in the table below.

	Supplier *A*	Supplier *B*
Sample means	110	125
Sample standard deviation	10	15

The test statistic for determining if there is a difference in the and *B* is:

A) F test.
B) t test.
C) Z test.
D) Chi-Square

Exhibit 12-2

Last school year, the student body of a local university consisted of 30% freshmen, 26% sophomores, 26% juniors, and 20% seniors. A sample of 300 students from this year's student body showed the following number of students in each classification.

Freshmen	83
Sophomores	68
Juniors	85
Seniors	64

We are interested in determining whether or not there has been a significant change in the classifications between the last school year and this school year.

6) Refer to Exhibit 12-2. The expected number of freshmen is
   a. 83
   b. 90
   c. 30
   d. 10

7) Refer to Exhibit 12-2. The expected frequency of seniors is
   a. 60
   b. 20%
   c. 68
   d. 64

8) Refer to Exhibit 12-2. The calculated value for the test statistic equa
   a. 0.5444
   b. 300
   c. 1.6615
   d. 6.6615

9) Refer to Exhibit 12-2. At 95% confidence, the null hypothesis
   a. should not be rejected
   b. should be rejected
   c. was designed wrong
   d. None of these alternatives is correct.

Exhibit 13-2
A software firm collected data for a sample of 18 computer programmers. A suggestion was made that regression analysis could be used to determine if the salary was related to the years experience ($y = \beta_0 + \beta_1 * x + \varepsilon$).
The table below summarizes the regression results.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.59
R Square	A
Adjusted R Square	0.30
Standard Error	4.87
Observations	G

ANOVA

	df	*SS*	*MS*	*F*
Regression	1	197.9	197.9	8.34
Residual	B	379.6	23.7	
Total	C	D		

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-4.3	E	-0.35	0.7
X Variable 1	0.43	0.15	F	0.01

10) Refer to Exhibit 13-2 (regression results), the value of **A** is:

A) 0.34
B) 0.55
C) 0.78
D) 0.19

11) Refer to Exhibit 13-2, the value of **B** is:

A) 14
B) 12
C) 13
D) 16

12) Refer to Exhibit 13-2, the value of **C** is:

A) 15
B) 17
C) 14
D) 16

13) Refer to Exhibit 13-2, the value of **D** is:

A) 385.2
B) 633.8
C) 445.1
D) 577.5

14) Refer to Exhibit 13-2, the value of **E** is:

A) 12.3
B) 18.2
C) 11.8
D) -10.1

15) Refer to Exhibit 13-2, the value of **F** is:

A) 4.2
B) 3.5
C) 2.9
D) 7.4

16) Refer to Exhibit 13-2, the value of **G** is:

A) 13
B) 18
C) 16
D) 15

17) Refer to Exhibit 13-2, the regression equation is:

A) $y = -4.29 + 0.43x$
B) $y = -0.3 + 2.9x$
C) $y = -12.3 + 0.73x$
D) $y = -0.1 + 8.34x$

18) Refer to Exhibit 13-2, the null hypothesis H_0: $\beta_1 = 0$

A) Cannot be rejected.
B) Will remain the same.
C) Will be accepted.
D) Will be rejected.

19) The value of $F_{.05}$ with 8 numerator and 19 denominator deg

A) 2.48
B) 4.58
C) 3.63
D) 1.96

20) The symbol used for the variance of the population is

A) σ
B) σ^2
C) S
D) S^2

Section 1: Multiple Choice (80 points):

Note: Use a pencil, not a pen, so in case you make a mistake, you can fix it. We will NOT change the answer sheet; the question will get zero credit if you pick multiple answers.

1) When testing for the difference between two population variances with sample sizes of $n_1 = 10$ and $n_2 = 12$, what is (are) the number (s) of degrees of freedom?

A) 10 and 12
B) 9 and 11
C) 22
D) 20

2) The statistical distribution that is used for testing the difference between two population variances is the:
A) Student's *t* distribution.
B) standard normal distribution.
C) binomial distribution.
D) *F* distribution.

3) A manager is considering the purchase of new production equipment to improve the output of the plant. Suppose the equipment from two suppliers is extensively tested in multiple production runs. A total of 20 runs are recorded on Supplier A's equipment, and another 15 runs are reported from Supplier B's equipment. The volume produced is recorded for each of the 35 runs. The results are summarized in the table below.

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Juniors	85
Seniors	64

We are interested in determining whether or not there has been a significant change in the classifications between the last school year and this school year.

6) Refer to Exhibit 12-2. The expected number of freshmen is
   a. 83
   b. 90
   c. 30
   d. 10

7) Refer to Exhibit 12-2. The expected frequency of seniors is
   a. 60
   b. 20%
   c. 68
   d. 64

8) Refer to Exhibit 12-2. The calculated value for the test statistic equals
   a. 0.5444
   b. 300
   c. 1.6615
   d. 6.6615

9) Refer to Exhibit 12-2. At 95% confidence, the null hypothesis
   a. should not be rejected
   b. should be rejected
   c. was designed wrong
   d. None of these alternatives is correct.

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A software firm collected data for a sample of 18 computer programmers. A suggestion was made that regression analysis could be used to determine if the salary was related to the years of experience ($y = \beta_0 + \beta_1 * x + \varepsilon$).
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Standard Error	4.87
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ANOVA	df	SS	MS	F
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Residual	**B**	379.6	23.7	
Total	**C**	**D**		

	Coefficients	Standard Error	t Stat	P-value
Intercept	-4.3	**E**	-0.35	0.7
X Variable 1	0.43	0.15	**F**	0.01

10) Refer to Exhibit 13-2 (regression results), the value of **A** *is:*

A) 0.34
B) 0.55
C) 0.78
D) 0.19

11) Refer to Exhibit 13-2, the value of **B** *is:*

A) 14
B) 12
C) 13
D) 16

12) Refer to Exhibit 13-2, the value of **C** is:

A) 15
B) 17
C) 14
D) 16

13) Refer to Exhibit 13-2, the value of **D** is:

A) 385.2
B) 633.8
C) 445.1
D) 577.5

14) Refer to Exhibit 13-2, the value of **E** is:

A) 12.3
B) 18.2
C) 11.8
D) -10.1

15) Refer to Exhibit 13-2, the value of **F** is:

A) 4.2
B) 3.5
C) 2.9
D) 7.4

16) Refer to Exhibit 13-2, the value of **G** is:

A) 13
B) 18
C) 16
D) 15

Business Statistics
ECON380
Exam 3
Dr. Esmaeil Ebadi

Exhibit 10-13
In order to determine whether or not there is a significant difference between the hourly wages of the two companies, the following data have been accumulated.

Company 1	Company 2
$n_1 = 80$	$n_2 = 60$
$\bar{x}_1 = \$10.80$	$\bar{x}_2 = \$10.00$
$\sigma_1 = \$2.00$	$\sigma_2 = \$1.50$

1. Refer to Exhibit 10-13. The null hypothesis for this test is
   a. $\mu 1 - \mu 2 \neq 0$
   b. $\mu 1 - \mu 2 \geq 0$
   c. $\mu 1 - \mu 2 \leq 0$
   d. $\mu 1 - \mu 2 = 0$

2. Refer to Exhibit 10-13. The point estimate of the difference between the means is
   a. 20
   b. 0.8
   c. 0.50
   d. -20

3. Refer to Exhibit 10-13. The test statistic has a value of
   a. 1.96
   b. 1.645
   c. 0.80
   d. 2.7

Exhibit 10-8
The following data have been accumulated to determine whether or not there is a significant difference between the hourly wages of the two companies.

	Company A	Company B
Sample size	80	60
Sample mean	$16.75	$16.25
Population standard deviation	$1.00	$0.95

4. Refer to Exhibit 10-8. A point estimate for the difference between the two sample means is
   a. 20
   b. 0.50
   c. 0.25
   d. 1.00

10. Refer to Exhibit 11-5. The null hypothesis is to be tested at the 5% significance level. The critical value(s) from the table is(are)
    a. 22.36
    b. 23.68
    c. 5.00 and 24.73
    d. 5.62 and 26.11

11. Refer to Exhibit 11-5. The null hypothesis
    a. should be rejected
    b. should not be rejected
    c. should be revised
    d. None of these alternatives is correct.

Exhibit 11-6

	Sample A	Sample B
s^2	40	96
n	16	26

We want to test the hypothesis that the population variances are equal.

12. Refer to Exhibit 11-6. The test statistic for this problem equals
    a. 0.417
    b. .843
    c. 2.4
    d. 1.500

13. Refer to Exhibit 11-6. At 95% confidence, the null hypothesis
    a. should be rejected
    b. should not be rejected
    c. should be revised
    d. None of these alternatives is correct.

14. Which of the following has an F distribution?
    a. $(n - 1)S/\sigma$
    b. S_1/S_2
    c. $(n - 1)S_1/S_2$
    d. S_1^2/S_2^2

15. The sampling distribution used when making inferences about a single population's variance is
    a. an F distribution
    b. a t distribution
    c. a chi-square distribution
    d. a normal distribution

5. Refer to Exhibit 10-8. The test statistic is
   a. 0.098
   b. 1.645
   c. 2.75
   d. 3.01

6. Refer to Exhibit 10-8. The null hypothesis ($\alpha = 0.05$)
   a. should be rejected
   b. should not be rejected
   c. should be revised
   d. None of these alternatives is correct.

Exhibit 11-1

Last year, the standard deviation of the ages of the students at UA was 1.8 years. A sample of 61 students recently had a standard deviation of 2.1 years. We are interested in testing to see if there has been a significant change in the standard deviation of the ages of the students at UA.

7. Refer to Exhibit 11-1. The test statistic is
   a. 44.08
   b. 79.08
   c. 81.67
   d. 3.24

8. Refer to Exhibit 11-1. At 95% confidence, the null hypothesis
   a. should be rejected
   b. should not be rejected
   c. should be revised
   d. None of these alternatives is correct.

Exhibit 11-5

$n = 14$ $s = 20$

$H_0: \sigma^2 \leq 500$
$H_a: \sigma^2 \geq 500$

9. Refer to Exhibit 11-5. The test statistic for this problem equals
   a. .63
   b. 12.68
   c. 13.33
   d. 13.66

Business Statistics
ECON380
Exam 3
Dr. Esmaeil Ebadi

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In order to determine whether or not there is a significant difference between the hourly wages of the two companies, the following data have been accumulated.

Company 1	Company 2
$n_1 = 80$	$n_2 = 60$
$\bar{x}_1 = \$10.80$	$\bar{x}_2 = \$10.00$
$\sigma_1 = \$2.00$	$\sigma_2 = \$1.50$

1. Refer to Exhibit 10-13. The null hypothesis for this test is
   a. $\mu 1 - \mu 2 \neq 0$
   b. $\mu 1 - \mu 2 \geq 0$
   c. $\mu 1 - \mu 2 \leq 0$
   d. $\mu 1 - \mu 2 = 0$

2. Refer to Exhibit 10-13. The point estimate of the difference between the means is
   a. 20
   b. 0.8
   c. 0.50
   d. -20

3. Refer to Exhibit 10-13. The test statistic has a value of
   a. 1.96
   b. 1.645
   c. 0.80
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Sample mean	$16.75	$16.25
Population standard deviation	$1.00	$0.95

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   a. 20
   b. 0.50
   c. 0.25
   d. 1.00

10. Refer to Exhibit 11-5. The null hypothesis is to be tested at the 5% significance level. The critical value(s) from the table is(are)
    a. 22.36
    b. 23.68
    c. 5.00 and 24.73
    d. 5.62 and 26.11

11. Refer to Exhibit 11-5. The null hypothesis
    a. should be rejected
    b. should not be rejected
    c. should be revised
    d. None of these alternatives is correct.

Exhibit 11-6

	Sample A	Sample B
s^2	40	96
n	16	26

We want to test the hypothesis that the population variances are equal.

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    a. 0.417
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    c. $(n - 1)S_1/S_2$
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   b. 1.645
   c. 2.75
   d. 3.01

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   b. should not be rejected
   c. should be revised
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Last year, the standard deviation of the ages of the students at UA was 1.8 years. A sample of 61 students recently had a standard deviation of 2.1 years. We are interested in testing to see if there has been a significant change in the standard deviation of the ages of the students at UA.

7. Refer to Exhibit 11-1. The test statistic is
   a. 44.08
   b. 79.08
   c. 81.67
   d. 3.24

8. Refer to Exhibit 11-1. At 95% confidence, the null hypothesis
   a. should be rejected
   b. should not be rejected
   c. should be revised
   d. None of these alternatives is correct.

Exhibit 11-5

$n = 14$ $s = 20$

$H_0: \sigma^2 \leq 500$
$H_a: \sigma^2 \geq 500$

9. Refer to Exhibit 11-5. The test statistic for this problem equals
   a. .63
   b. 12.68
   c. 13.33
   d. 13.66

1) If the p-value for a one-tailed test is 0.019, then the null hypothesis

a) can be rejected at a significance level of 0.01.
b) would be rejected or not rejected depending on the value of the statistic (the observ
c) would be rejected or not rejected depending on the value of the statistic and the crit
d) can be rejected at a significance level of 0.10.
e) may or may not be rejected, but there is no enough information to answer this quest

2) Consider the following null and alternative hypotheses.

H_o: $\mu \geq 67$
H_a: $\mu < 67$

These hypotheses _____.

a) indicate a one-tailed test with a rejection area in the right tail
b) indicate a one-tailed test with a rejection area in the left tail
c) indicate a two-tailed test
d) are established incorrectly
e) are not mutually exclusive

3) In a two-tailed hypothesis about a population mean with a sample size of 100, c
known, and $\alpha = 0.10$, the rejection region would be _____.

a) $z > 1.64$
b) $z > 1.28$
c) $z < -1.28$ and $z > 1.28$
d) $z < -1.64$ and $z > 1.64$
e) $z < -2.33$ and $z > 2.33$

4) In a two-tailed hypothesis about a population mean with a sample size of 100, c
known, and $\alpha = 0.05$, the rejection region would be _____.

a) $z > 1.64$
b) $z > 1.96$
c) $z < -1.96$ and $z > 1.96$
d) $z < -1.64$ and $z > 1.64$
e) $z < -2.33$ and $z > 2.33$

5) Suppose you are testing the null hypothesis that a population mean is less than or equal to 46, against the alternative hypothesis that the population mean is greater than 46. The sample size is 25 and $\alpha = .05$. If the sample mean is 50 and the population standard deviation is 8, the observed z value is _____.

a) 2.5
b) -2.5
c) 6.25
d) -6.25
e) 12.5

6) Suppose you are testing the null hypothesis that a population mean is greater than or equal to 60, against the alternative hypothesis that the population mean is less than 60. The sample size is 64 and $\alpha = .05$. If the sample mean is 58 and the population standard deviation is 16, the observed z value is _____.

a) -1
b) 1
c) -8
d) 8
e) 58

7) A coffee-dispensing machine is supposed to deliver 8 ounces of liquid into each paper cup, but a consumer believes that the actual mean amount is less. The consumer obtained a sample of 49 cups of the dispensed liquid with average of 7.75 ounces. If the sample variance of the dispensed liquid per cup is 0.81 ounces, and $\alpha = 0.05$, the p-value is approximately

a) 0.05
b) 0.029
c) 0.06
d) 0.015
e) 0.10

8) The local swim team is considering offering a new semi-private class aimed at entry-level swimmers, but needs a minimum number of swimmers to sign up in order to be cost effective. Last year's data showed that during 8 swim sessions the average number of entry-level swimmers attending was 15. Suppose the instructor wants to conduct a hypothesis test and the alternative hypothesis is "the population mean is greater than 15." If the sample size is 5, σ is known, and $\alpha = .01$, the critical value of z is _____.

a) 2.575
b) -2.575
c) 2.33
d) -2.33
e) 2.45

9) The local swim team is considering offering a new semi-private class aimed at entry-level swimmers, but needs at minimum number of swimmers to sign up in order to be cost effective. Last year's data showed that during 8 swim sessions the average number of entry-level swimmers attending was 15. Suppose the instructor wants to conduct a hypothesis test. The alternative hypothesis for this hypothesis test is: "the population mean is less than 15". The sample size is 8, σ is known, and $\alpha = .05$, the critical value of z is _____.

a) 1.645
b) -1.645
c) 1.96
d) -1.96
e) 2.05

10) The customer help center in your company receives calls from customers who need help with some of the customized software solutions your company provides. Your company claims that the average waiting time is 7 minutes at the busiest time, from 8 a.m. to 10 a.m., Monday through Thursday. One of your main clients has recently complained that every time she calls during the busy hours, the waiting time exceeds 7 minutes. You conduct a statistical study to determine the average waiting time with a sample of 35 calls, for which you obtain an average waiting time of 8.15 minutes. Suppose that you can assume that waiting times are normally distributed. The sample standard deviation is 4.2 minutes. The null hypothesis is:

a) $n \neq 35$
b) $n = 35$
c) $\mu = 7$
d) $\mu \neq 7$
e) $\mu > 7$

14) Golf course designer Roberto Langabeer is evaluating two sites, Palmetto Dunes and Ocean Greens, for his next golf course. He wants to prove that Palmetto Dunes residents (population 1) play golf more often than Ocean Greens residents (population 2). Roberto commissions a market survey to test this hypothesis. The market researcher used a random sample of 64 individuals from each suburb, and reported the following: $\bar{x}_1 = 16$ times per month and $\bar{x}_2 = 14$ times per month. Assume that $\sigma_1 = 4$ and $\sigma_2 = 3$. With $\alpha = .01$, the observed z value is _____.

a) 18.29
b) 6.05
c) 5.12
d) 3.40
e) 3.20

15) Lucy Baker is analyzing demographic characteristics of two television programs, *American Idol* (population 1) and *60 Minutes* (population 2). Previous studies indicate no difference in the ages of the two audiences. (The mean age of each audience is the same.) Her staff randomly selected 100 people from each audience, and reported the following: $\bar{x}_1 = 43$ years and $\bar{x}_2 = 45$ years. Assume that $\sigma_1 = 5$ and $\sigma_2 = 8$. Assuming a two-tail test and $\alpha = .05$, the observed z value is _____.

a) -2.12
b) -2.25
c) -5.58
d) -15.38
e) -20.68

16) A researcher believes a new diet should improve weight gain. To test his hypothesis a random sample of 10 people on the old diet and an independent random sample of 10 people on the new diet were selected. The selected people on the old diet gain an average of 5 pounds with a standard deviation of 2 pounds, while the average gain for selected people on the new diet was 8 pounds with a standard deviation of 1.5 pounds. Assume that the values are normally distributed in each population and that the population variances are approximately equal. Using $\alpha = 0.05$, the observed t value for this test is _____.

a) -1.96
b) -1.645
c) -2.100
d) -3.79
e) -1.734

17) The local oil changing business is very busy on Saturday mornings and is considering expanding. A national study of similar businesses reported the mean number of customers waiting to have their oil changed on Saturday morning is 3.6. Suppose the local oil changing business owner, wants to perform a hypothesis test. The null hypothesis is the population mean is 3.6 and the alternative hypothesis that the population mean is not equal to 3.6. The owner takes a random sample of 81 Saturday mornings during the past year and determines the sample mean is 4.2 and the sample standard deviation is 1.4. It can be assumed that the population is normally distributed. The observed "t" value for this problem is _____.

a) 1.81
b) 2.43
c) 3.86
d) 1.63
e) 1.75

18) Ophelia O'Brien, VP of Consumer Credit of American First Banks (AFB), monitors the default rate on personal loans at the AFB member banks. One of her standards is "no more than 5% of personal loans should be in default." On each Friday, the default rate is calculated for a sample of 800 personal loans. Last Friday's sample contained 30 defaulted loans. Using $\alpha = 0.10$, the observed z value is _____.

a) -1.62
b) -2.3
c) 1.28
d) -1.45
e) -1.37

19) A researcher believes a new diet should improve weight gain. To test his hypothesis a random sample of 10 people on the old diet and an independent random sample of 10 people on the new diet were selected. The selected people on the old diet gain an average of 5 pounds with a standard deviation of 2 pounds, while the average gain for selected people on the new diet was 8 pounds with a standard deviation of 3 pounds. Assume that the values are normally distributed in each population and that the population variances are approximately equal. Using $\alpha = 0.05$, the observed t value for this test is _____.

a) -2.96
b) -2.53
c) -2.63
d) -3.74
e) -3.88

20) Golf course designer Roberto Langabeer is evaluating two sites, Palmetto Dunes and Ocean Greens, for his next golf course. He wants to peove that Palmetto Dunes residents (population 1) play golf more often than Ocean Greens residents (population 2). Roberto commissions a market survey to test this hypothesis. The market researcher used a random sample of 81 individuals from each suburb, and reported the following: $\bar{x}_1 = 16$ times per month and $\bar{x}_2 = 14$ times per month. Assume that $\sigma_1 = 4$ and $\sigma_2 = 3$. With $\alpha = .01$, the observed z value is _____

a) 3.7
b) 3.6
c) 3.5
d) 3.40
e) 3.20

1)Consider the following null and alternative hypotheses.

H_o: $\mu \geq 67$

H_a: $\mu < 67$

These hypotheses _____.

a) indicate a one-tailed test with a rejection area in the right tail
b) indicate a one-tailed test with a rejection area in the left tail
c) indicate a two-tailed test
d) are established incorrectly
e) are not mutually exclusive

2)In a two-tailed hypothesis about a population mean with a sample size of 100, σ is known, and $\alpha = 0.10$, the rejection region would be _____.

a) $z > 1.65$
b) $z > 1.28$
c) $z < -1.28$ and $z > 1.28$
d) $z < -1.65$ and $z > 1.65$
e) $z < -2.33$ and $z > 2.33$

3)In a two-tailed hypothesis about a population mean with a sample size of 100, σ is known, and $\alpha = 0.05$, the rejection region would be _____.

a) $z > 1.64$
b) $z > 1.96$
c) $z < -1.96$ and $z > 1.96$
d) $z < -1.64$ and $z > 1.64$
e) $z < -2.33$ and $z > 2.33$

4)Suppose you are testing the null hypothesis that a population mean is less than or equal to 46, against the alternative hypothesis that the population mean is greater than 46. The sample size is 25 and $\alpha = .05$. If the sample mean is 50 and the population standard deviation is 8, the observed z value is _____.

a) 2.5
b) -2.5
c) 6.25
d) -6.25
e) 12.5

5)Suppose you are testing the null hypothesis that a population mean is greater than or equal to 60, against the alternative hypothesis that the population mean is less than 60. The sample size is 64 and $\alpha = .05$. If the sample mean is 58 and the population standard deviation is 16, the observed z value is _____.

a) -1
b) 1
c) -8
d) 8
e) 58

6)In order to determine an interval for the mean of a population with unknown standard deviation a sample of 61 items is selected. The mean of the sample is determined to be 23. The number of degrees of freedom for reading the t value is

a. 22
b. 23
c. 60
d. 61

7)Whenever the population standard deviation is **unknown** and the population has a normal or near-normal distribution, which distribution is used in developing an interval estimation?

a. standard distribution
b. z distribution
c. alpha distribution
d. t distribution

8)In developing an interval estimate, if the population standard deviation is unknown

a. it is impossible to develop an interval estimate
b. the standard deviation is arrived at using the range
c. the sample standard deviation can be used
d. it is assumed that the population standard deviation is 1

9) The t value for a 95% confidence interval estimation with 24 degrees of freedom is

a. 1.711
b. 2.064
c. 2.492
d. 2.069

10)A 95% confidence interval for a population mean is determined to be 100 to 120. If the confidence coefficient is reduced to 0.90, the interval for mean is?

a. becomes narrower
b. becomes wider
c. does not change
d. becomes 0.1

11)A sample of 225 elements from a population with a standard deviation of 75 is selected. The sample mean is 180. The 95% confidence interval for the mean is?

a. 105.0 to 225.0
b. 175.0 to 185.0
c. 100.0 to 200.0
d. 170.2to 189.8

12)In a random sample of 144 observations, $\bar{p} = 0.6$. The 95% confidence interval for P is

a. 0.52 to 0.68
b. 0.144 to 0.200
c. 0.60 to 0.70
d. 0.50 to 0.70

13)A random sample of 1000 people was taken. Four hundred fifty of the people in the sample favored Candidate A. The 95% confidence interval for the true proportion of people who favors Candidate A is

a. 0.419 to 0.481
b. 0.40 to 0.50
c. 0.45 to 0.55
d. 1.645 1.96

14)The critical value of t for a two-tail test with 6 degrees of freedom and α =.05 is

a. 2.447
b. 1.943
c. 2.365
d. 1.985

15)The fact that the sampling distribution of sample means can be approximated by a normal probability distribution whenever the sample size is large is based on the

a. central limit theorem
b. fact that we have tables of areas for the normal distribution

c. assumption that the population has a normal distribution
d. None of these alternatives is correct.

16)A population has a mean of 53 and a standard deviation of 21. A sample of 49 observations will be taken. The probability that the sample mean will be greater than 57.95 is

a. 0
b. .0495
c. .4505
d. .9505

17)A subset of a population selected to represent the population is

a. a subset
b. a sample
c. a small population
d. a parameter

18)Suppose you are testing the null hypothesis that a population mean is less than or equal to 50, against the alternative hypothesis that the population mean is greater than 50. The sample size is 25 and α =.05. If the sample mean is 46 and the population standard deviation is 8, what is the observed z-value?

a. 3.5
b. -3.5
c. 2.5
d. -2.5

19)The local swim team is considering offering a new semi-private class aimed at entry-level swimmers but needs a minimum number of swimmers to sign up to be cost-effective. Last year's data showed that during 8 swim sessions, the average number of entry-level swimmers attending was 15. Suppose the instructor wants to conduct a hypothesis test, and the alternative hypothesis is "the population mean is not 15." If the sample size is 15, the standard deviation is known, and α = .01, what is the critical value of z?

a. ±2.58
b. ±3.58
c. ±1.65
d. ±1.96

20)The customer help center in your company receives calls from customers who need help with some of the customized software solutions your company provides. Your company claims the average waiting time is 5 minutes at the busiest time, from 8 a.m. to 10 a.m., Monday through Thursday. One of your main clients has recently complained that every time she calls during the busy hours, the waiting time exceeds 5 minutes. You conducted a statistical study to determine the average waiting time with a sample of 16 calls, for which you obtained an average waiting time of 5.5 minutes. Suppose that you can assume that waiting times are normally distributed. The sample variance is 1 minute. What is the observed (calculated) t value?

a. 4
b. 3
c. 1
d. 2