NOTE: This is a sample test and may not be inclusive of all materials that may be contained in Test 3. Please study all sections that we discussed in class.

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

Test the given claim using the traditional method of hypothesis testing. Assume that the sample has been randomly selected from a population with a normal distribution.

1) In tests of a computer component, it is found that the mean time between failures is 520 hours. A modification is made which is supposed to increase the time between failures. Tests on a random sample of 10 modified components resulted in the following times (in hours) between failures. At the 0.05 significance level, test the claim that for the modified components, the mean time between failures is greater than 520 hours.

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

Construct a confidence interval for \( \mu_d \), the mean of the differences \( d \) for the population of paired data. Assume that the population of paired differences is normally distributed.

2) If \( \bar{d} = 3.125 \), \( S_d = 2.911 \), and \( n = 8 \), determine a 95 percent confidence interval for \( \mu_d \).

Given the linear correlation coefficient \( r \) and the sample size \( n \), determine the critical values of \( r \) and use your finding to state whether or not the given \( r \) represents a significant linear correlation. Use a significance level of 0.05.

3) \( r = -0.412 \), \( n = 25 \)

Construct a scatter diagram for the given data.

4) 

| \( x \) | 10 | -18 | -19 | -1 | -20 | 5 |
| \( y \) | 84 | -42 | 88 | -68 | 81 | 5 |
Use the given data to find the equation of the regression line. Round the final values to three significant digits, if necessary.

5) \[
\begin{array}{c|cccc}
 x & 2 & 4 & 5 & 6 \\
 y & 7 & 11 & 13 & 20 \\
\end{array}
\]
A) \( y = 2.8x \)  
B) \( y = 3.0x \)  
C) \( y = 0.15 + 3.0x \)  
D) \( y = 0.15 + 2.8x \)

6) \[
\begin{array}{c|cccc}
 x & 1 & 3 & 5 & 7 \\
 y & 143 & 116 & 100 & 98 \\
\end{array}
\]
A) \( y = -150.7 + 6.8x \)  
B) \( y = 150.7 - 6.8x \)  
C) \( y = -140.4 + 6.2x \)  
D) \( y = 140.4 - 6.2x \)

Find the number of successes \( x \) suggested by the given statement.

7) Among 750 people selected randomly from among the eligible voters in one city, 57.5% were homeowners
A) 426  
B) 431  
C) 436  
D) 435

The two data sets are dependent. Find \( d \) to the nearest tenth.

8) \[
\begin{array}{c|cccc}
 A & 51 & 64 & 51 & 63 \\
 B & 23 & 23 & 27 & 25 \\
\end{array}
\]
A) 40.0  
B) 41.6  
C) 19.2  
D) 32.0
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use the traditional method to test the given hypothesis. Assume that the samples are independent and that they have been randomly selected.

9) In a random sample of 500 people aged 20-24, 22% were smokers. In a random sample of 450 people aged 25-29, 14% were smokers. Test the claim that the proportion of smokers in the two age groups is the same. Use a significance level of 0.01.

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

10) n_1 = 360, n_2 = 211, x_1 = 78, x_2 = 50

A) 0.224  B) 0.202  C) 0.157  D) 0.112

11) x_1 = 14, n_1 = 37, x_2 = 31, n_2 = 49; Construct a 90% confidence interval for the difference between population proportions p_1 - p_2.

A) -0.428 < p_1 - p_2 < -0.081  B) 0.205 < p_1 - p_2 < 0.552
C) 0.172 < p_1 - p_2 < 0.585  D) 0.585 < p_1 - p_2 < 1.72

12) A report on the nightly news broadcast stated that 15 out of 122 households with pet dogs were burglarized and 22 out of 210 without pet dogs were burglarized.

A) 0.001  B) 0.203  C) 0.864  D) 0.508

Solve the problem.

13) When performing a hypothesis test for the ratio of two population variances, the upper critical F value is denoted F_{R}. The lower critical F value, F_{L}, can be found as follows: interchange the degrees of freedom, and then take the reciprocal of the resulting F value found in table A-5. F_{R} can be denoted F_{\alpha/2} and F_{L} can be denoted F_{1-\alpha/2}.

Find the critical values F_{L} and F_{R} for a two-tailed hypothesis test based on the following values:

n_1 = 10, n_2 = 16, \alpha = 0.05

A) 0.3202, 3.1227  B) 3.1227, 3.7743  C) 0.2653, 3.1227  D) 0.2653, 3.7743

Construct a confidence interval for \mu_d, the mean of the differences d for the population of paired data. Assume that the population of paired differences is normally distributed.

14) Using the sample paired data below, construct a 90% confidence interval for the population mean of all differences x - y.

\begin{array}{cccc}
\text{x} & 3.5 & 5.3 & 5.4 & 4.8 & 6.9 \\
\text{y} & 3.2 & 4.1 & 5.0 & 5.5 & 4.6 \\
\end{array}

A) -0.37 < \mu_d < 1.77  B) -0.31 < \mu_d < 1.71
C) -0.07 < \mu_d < 1.47  D) 0.22 < \mu_d < 7.48
15) A test of abstract reasoning is given to a random sample of students before and after they completed a formal logic course. The results are given below. Construct a 95% confidence interval for the mean difference between the before and after scores.

<table>
<thead>
<tr>
<th>Before</th>
<th>74</th>
<th>83</th>
<th>75</th>
<th>88</th>
<th>84</th>
<th>63</th>
<th>93</th>
<th>84</th>
<th>91</th>
<th>77</th>
</tr>
</thead>
<tbody>
<tr>
<td>After</td>
<td>73</td>
<td>77</td>
<td>70</td>
<td>77</td>
<td>74</td>
<td>67</td>
<td>95</td>
<td>83</td>
<td>84</td>
<td>75</td>
</tr>
</tbody>
</table>

A) $0.2 < \mu_d < 7.2$  
B) $1.2 < \mu_d < 5.7$  
C) $0.8 < \mu_d < 6.6$  
D) $1.0 < \mu_d < 6.4$

Express the null hypothesis $H_0$ and the alternative hypothesis $H_1$ in symbolic form. Use the correct symbol ($\mu$, $p$, $\sigma$) for the indicated parameter.

16) The manufacturer of a refrigerator system for beer kegs produces refrigerators that are supposed to maintain a true mean temperature, $\mu$, of $51^\circ$F, ideal for a certain type of German pilsner. The owner of the brewery does not agree with the refrigerator manufacturer, and claims he can prove that the true mean temperature is incorrect.

A) $H_0: \mu \geq 51^\circ$  
B) $H_0: \mu = 51^\circ$  
C) $H_0: \mu \leq 51^\circ$  
D) $H_0: \mu \neq 51^\circ$

$H_1: \mu < 51^\circ$  
$H_1: \mu \neq 51^\circ$  
$H_1: \mu > 51^\circ$  
$H_1: \mu = 51^\circ$

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

17) Carter Motor Company claims that its new sedan, the Libra, will average better than 28 miles per gallon in the city. 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.

A) There is sufficient evidence to support the claim that the mean is greater than 28 miles per gallon.  
B) There is no sufficient evidence to support the claim that the mean is less than 28 miles per gallon.  
C) There is sufficient evidence to support the claim that the mean is less than 28 miles per gallon.  
D) There is no sufficient evidence to support the claim that the mean is greater than 28 miles per gallon.

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

Test the given claim using the traditional method of hypothesis testing. Assume that the sample has been randomly selected from a population with a normal distribution.

18) Use a significance level of $\alpha = 0.01$ to test the claim that $\mu > 2.85$. The sample data consists of 9 scores for which $\bar{x} = 3.18$ and $s = 0.58$.

19) A poll of 1,068 adult Americans reveals that 48% of the voters surveyed prefer the Democratic candidate for the presidency. At the 0.05 level of significance, test the claim that at least half of all voters prefer the Democrat.

20) According to a recent poll 53% of Americans would vote for the incumbent president. If a random sample of 100 people results in 45% who would vote for the incumbent, test the claim that the actual percentage is 53%. Use a 0.10 significance level.