MULTIPLE CHOICE (Circle the best answer. Each problem is worth 4 points.)

1. Given the following stem and leaf plot of test scores, find the 5-number summary.

   4 |  4  8
   5 |  1 3 9
   6 |  1 4 5 6
   7 |  0 2 2 4 7 8 8
   8 |  0 1 1 3 5 5 6 8 8
   9 |  0 2 4 4 6 8

   (a) min = 44, Q1 = 65, median=78, Q3=88, max=98
   (b) min = 44, Q1 = 64, median=78, Q3=90, max=98
   (c) min = 44, Q1 = 66, median=78, Q3=77, max=98
   (d) min = 44, Q1 = 65, median=80, Q3=85, max=98
   (e) min = 44, Q1 = 65, median=80, Q3=88, max=98

2. In a group of teenagers, 20% smoke cigarettes, 40% drink alcohol, and 10% do both. What is the probability that a randomly selected teenager from the group has at least one of these “bad habits”?

   (a) .30
   (b) .40
   (c) .50
   (d) .60
   (e) .70

3. A student randomly guesses at 10 multiple-choice questions. Each question has 5 possible choices. Find the mean and standard deviation of the number of questions the student answers correctly?

   (a) $\mu = 5$ and $\sigma = \sqrt{2.5}$
   (b) $\mu = 50$ and $\sigma = \sqrt{250}$
   (c) $\mu = 2$ and $\sigma = \sqrt{1.6}$
   (d) $\mu = 2$ and $\sigma = 1.6$
   (e) $\mu = 5$ and $\sigma = 16$
4. A student randomly guesses at 5 multiple-choice questions. Each question has 5 possible choices. What is the probability that the student gets exactly 2 correct?

(a) 0.0248
(b) 0.0400
(c) 0.1024
(d) 0.2048
(e) none of the above

5. A data set has a mean of 80 and a standard deviation of 5. According to Chebyshev's inequality, the smallest interval in which at least 75% of the data will fall is

(a) (79, 81)
(b) (77, 83)
(c) (75, 85)
(d) (73, 87)
(e) (70, 90)

6. Suppose the distribution of birth weights of babies born at Big General Hospital is **normal** (symmetric, bell-shaped, etc.). If the mean weight is 7.5 lb and the standard deviation is 1.0 lb, about 68% of the babies will weigh between ....

(a) 5.5 and 9.5 lb.
(b) 6.0 and 9.0 lb.
(c) 6.5 and 8.5 lb.
(d) 7.0 and 8.0 lb.
(e) 7.3 and 7.7 lb.

7. The heights (in inches) of students in a statistics class would be an example of what type of data?

(a) qualitative and nominal
(b) qualitative and ordinal
(c) quantitative and interval
(d) quantitative and ratio
(e) categorical

8. Which one of the following confidence levels gives the widest confidence interval?

(a) 90%
(b) 95%
(c) 97%
(d) 98%
(e) 99%
9 In hypothesis testing, if the $p$-value is less than or equal to $\alpha$ (the level of significance), then

(a) we have sufficient evidence to reject $H_0$.
(b) we do not have sufficient evidence to reject $H_0$.
(c) we have increased the power of the test.
(d) we have committed a Type I error.
(e) we have committed a Type II error.

10 For the probability distribution given in the table below, find the mean.

<table>
<thead>
<tr>
<th>$x$</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(x)$</td>
<td>1/2</td>
<td>1/3</td>
<td>1/6</td>
</tr>
</tbody>
</table>

(a) $\mu = 0$
(b) $\mu = 2/3$
(c) $\mu = 1$
(d) $\mu = 5/3$
(e) $\mu = 2$

11 A political candidate wants to estimate his chances of winning the coming election for mayor. Out of a random sample of 1000 voters, 460 voters stated they supported the candidate. Find the 95% confidence interval for $p$, the true proportion of supporters.

(a) (.43, .49)
(b) (.42, .50)
(c) (.41, .51)
(d) (.40, .52)
(e) (.39, .53)

12 A random sample of the ACT scores of 100 students at State University provided a sample mean score of 22.0 with a sample standard deviation of 6.10. What is the 90% confidence interval for the mean score of all State students who had taken the ACT?

(a) (17.7, 26.3)
(b) (18.1, 25.9)
(c) (19.2, 24.8)
(d) (20.8, 23.2)
(e) (21.0, 23.0)
An investigator suspects that the proportion, $p$, of MTSU students that own a computer is close to .40. What sample size is needed to find an interval estimate of $p$ that has a .05 margin of error and a 90% confidence level? (Use .40 as a preliminary estimate of $p$.)

(a) 1,083  
(b) 542  
(c) 260  
(d) 369  
(e) 175

A machine that fills milk bottles is supposed to have a mean amount of milk equal to 32 ounces. An inspector suspects that that the true mean is less than 32 ounces. If a statistical hypothesis test is to be performed, how should the hypotheses be stated? Let $\mu$ represent the true mean amount of milk.

(a) $H_0: \mu < 32$ vs. $H_1: \mu = 32$  
(b) $H_0: \mu > 32$ vs. $H_1: \mu \leq 32$  
(c) $H_0: \mu = 32$ vs. $H_1: \mu < 32$  
(d) $H_0: \mu = 32$ vs. $H_1: \mu > 32$  
(e) $H_0: \mu \neq 32$ vs. $H_1: \mu = 32$

Four different brands of golf balls were tested for distance traveled when hit by a golf club. An incomplete analysis of variance table is given below.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand (treatment)</td>
<td>3</td>
<td>2794.389</td>
<td>931.463</td>
<td>???</td>
<td>???</td>
</tr>
<tr>
<td>Error</td>
<td>36</td>
<td>762.301</td>
<td>21.175</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>3556.690</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use an F test with $\alpha = .05$ to test for equality of distance means. Choose the best statement below.

(a) The F-statistic value is 3.67; we conclude that at least two means differ.  
(b) The F-statistic value is 3.67; we conclude that the means could very well be the same.  
(c) The F-statistic value is 43.99; we conclude that at least two means differ.  
(d) The F-statistic value is 43.99; we conclude that the means could very well be the same.  
(e) The F-statistic value cannot be determined with the information provided.
Suppose the weights of 10-year-old girls are normally distributed with a mean of 70 pounds and a standard deviation of 6 pounds. Find the weight that corresponds to the 95th percentile. (Round to nearest pound.)

(a) 78 lb 
(b) 80 lb 
(c) 82 lb 
(d) 83 lb 
(d) 85 lb 

Two methods of teaching reading to first graders are being compared. Independent random samples provided the following reading score data.

<table>
<thead>
<tr>
<th>Method 1</th>
<th>Method 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \bar{x}_1 ) = 65.7</td>
<td>( \bar{x}_2 ) = 72.5</td>
</tr>
<tr>
<td>( s_1 ) = 10.3</td>
<td>( s_2 ) = 12.6</td>
</tr>
<tr>
<td>( n_1 ) = 33</td>
<td>( n_2 ) = 45</td>
</tr>
</tbody>
</table>

Let \( \mu_1 \) = method 1 population mean reading score; 
\( \mu_2 \) = method 2 population mean reading score.

Construct a 99% confidence interval for \( \mu_2 - \mu_1 \). (Round to one decimal place.)

(a) 6.8 ± 4.3 
(b) 6.8 ± 4.7 
(c) 6.8 ± 5.1 
(d) 6.8 ± 5.4 
(e) 6.8 ± 6.7 

Refer to Problem 17 above and use the sample standard deviations given to determine what sample sizes are needed in order that a 99% confidence interval for \( \mu_2 - \mu_1 \) has a margin of error equal to 2.

(a) \( n_1 = n_2 = 726 \) 
(b) \( n_1 = n_2 = 440 \) 
(c) \( n_1 = n_2 = 255 \) 
(d) \( n_1 = n_2 = 180 \) 
(e) \( n_1 = n_2 = 109 \)
A random sample of 300 Big State University students provided the data in the contingency table below.

<table>
<thead>
<tr>
<th></th>
<th>Smoke</th>
<th>Don't Smoke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>Women</td>
<td>55</td>
<td>100</td>
</tr>
</tbody>
</table>

If smoking were independent of gender, what is the expected count for the table cell “women who don't smoke”?

(a) 105.000  (b) 100.000  (c) 95.583  (d) 92.500  (e) 75.000

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<table>
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<tbody>
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<td>85</td>
</tr>
<tr>
<td>Women</td>
<td>55</td>
<td>100</td>
</tr>
</tbody>
</table>

If a chi-square test for independence is performed using $\alpha = .10$, what is the test statistic value and the test conclusion?

(a) The test statistic value is 1.10; we conclude smoking could be independent of gender.
(b) The test statistic value is 1.10; we conclude smoking is very likely related to gender.
(c) The test statistic value is 2.83; we conclude smoking could be independent of gender.
(d) The test statistic value is 2.83; we conclude smoking is very likely related to gender.
(e) The test statistic value is 1.83; we conclude smoking is very likely related to gender.

The boxplot below indicates that the distribution of data from which it was made has most likely

(a) a distribution skewed to the right and a median larger than the mean
(b) a distribution skewed to the right and a mean larger than the median
(c) a distribution skewed to the left and a median larger than the mean
(d) a distribution skewed to the left and a mean larger than the median
(e) a distribution that is symmetric
Listed below is an ordered random sample of 30 final grades of students in courses taught by a certain Big State University professor.

58  58  62  65  66  68  69  71  75  76  78  78  79  79  79  80  80  80  81  83  84  86  88  88  89  90  92  92  94  99

Construct an approximate 95% confidence interval for the median grade of all students in courses taught by the professor. Use the “.4n − 2” rule.

(a)  (66, 90)      (b)  (68, 89)      (c)  (71, 88)      (d)  (75, 86)      (e)  (76, 84)

A shipment of 100 TV's contains 4 defective TV's. If a random sample (without replacement) of 3 TV's is taken from the shipment, what is the probability that the sample will contain no defective TV's. (Round to 3 decimal places.)

(a)  .531      (b)  .644      (c)  .739      (d)  .884      (e)  .970

For problems 24 – 25 Below is a set of paired data from a random sample of 15 recent fires in a certain suburban area. Distance (in miles) from fire station is represented by x, and fire damage (in thousands of dollars) is represented by y. Also below are summary statistics.

<table>
<thead>
<tr>
<th>x</th>
<th>3.4</th>
<th>1.8</th>
<th>4.6</th>
<th>2.3</th>
<th>3.1</th>
<th>5.5</th>
<th>0.7</th>
<th>3.0</th>
<th>2.6</th>
<th>4.3</th>
<th>2.1</th>
<th>1.1</th>
<th>6.1</th>
<th>4.8</th>
<th>3.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>26.2</td>
<td>17.8</td>
<td>31.3</td>
<td>23.1</td>
<td>27.5</td>
<td>36.0</td>
<td>14.1</td>
<td>22.3</td>
<td>19.6</td>
<td>31.3</td>
<td>24.0</td>
<td>17.3</td>
<td>43.2</td>
<td>36.4</td>
<td>26.1</td>
</tr>
</tbody>
</table>

Statistics: 3.28, 26.4133, SSxy = 171.114, SSxx = 34.784, SSyy = 911.517

The fitted least squares line is given by

(a) \( \hat{y} = 9.6 + 5.34 x \)    (b) \( \hat{y} = 10.3 + 4.92 x \)    (c) \( \hat{y} = 25.8 + 0.19 x \)
(d) \( \hat{y} = 12.1 + 3.28 x \)    (e) \( \hat{y} = 11.7 + 0.49 x \)

The 95% confidence interval for the mean fire damage when the distance is 3 miles is (23.722, 26.350). This means that

(a) 95% of the homes 3 miles away will catch fire and suffer between $23,722 and $26,350 in damages.
(b) We are 95% certain that all homes 3 miles away will suffer between $23,722 and $26,350 in damages if a fire occurs.
(c) 95% of the damages will be in the range $23,722 to $26,350 for homes 3 miles away.
(d) We are 95% certain that the average damage to homes 3 miles away that catch fire will be between $23,722 and $26,350.
(e) 95% of the fire damages can be explained by the 3 mile distance from the station.