Module 7 Test

Name___________________________________

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

You are given information about a straight line. Use two points to graph the equation.

1) The y-intercept is -7 and the slope is 0.

Answer: A

Objective: (14.1) Graph Linear Equation
Provide an appropriate response.

2) True or false? The straight-line graph of the linear equation \( y = b_0 + b_1x \) is vertical if \( b_1 = 0 \).
   
   A) True  
   B) False

   Answer: B

   Objective: (14.1) *Know Concepts: Linear Eqns with One Independent Variable

You are given information about a straight line. Determine whether the line slopes upward, slopes downward, or is horizontal.

3) The equation of the line is \( y = -3 \).
   
   A) Is horizontal  
   B) Slopes downward  
   C) Slopes upward

   Answer: A

   Objective: (14.1) Determine If Line Slopes Up, Slopes Down, or is Horizontal

4) The equation of the line is \( y = -7.6x \).
   
   A) Slopes upward  
   B) Is horizontal  
   C) Slopes downward

   Answer: C

   Objective: (14.1) Determine If Line Slopes Up, Slopes Down, or is Horizontal

The y-intercept and slope, respectively, of a straight line are given. Find the equation of the line.

5) 10 and 12
   
   A) \( y = 10x + 12 \)  
   B) \( y = 10 + 12x \)  
   C) \( y = 12 - 10x \)  
   D) \( y + 12x = 10 \)

   Answer: B

   Objective: (14.1) Find Linear Equation Given y-intercept/Slope

Is the data point, \( P \), an outlier, a potential influential observation, both, or neither?

6)

   A) Neither  
   B) Potential influential observation  
   C) Both  
   D) Outlier

   Answer: A

   Objective: (14.2) Identify Outlier/Potential Influential Observation

Determine the regression equation for the data. Round the final values to three significant digits, if necessary.

7) \[
\begin{array}{c|cccc}
   x & 0 & 3 & 4 & 5 & 12 \\
   y & 8 & 2 & 6 & 9 & 12 \\
\end{array}
\]
   
   A) \( \hat{y} = 4.88 + 0.625x \)  
   B) \( \hat{y} = 4.98 + 0.425x \)  
   C) \( \hat{y} = 4.98 + 0.725x \)  
   D) \( \hat{y} = 4.88 + 0.525x \)

   Answer: D

   Objective: (14.2) Determine Regression Equation
Objective: (14.2) Determine Regression Equation

A set of data points and the equations of two lines are given. For each line, determine \( \sum e^2 \). Then, determine which line fits the set of data points better, according to the least-squares criterion.

<table>
<thead>
<tr>
<th>x</th>
<th>1.2</th>
<th>1.4</th>
<th>1.6</th>
<th>1.8</th>
<th>2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>54</td>
<td>53</td>
<td>55</td>
<td>54</td>
<td>56</td>
</tr>
</tbody>
</table>

A) \( \hat{y} = 50.4 + 2.5x \)  
B) \( \hat{y} = 54 \)  
C) \( \hat{y} = 55.3 + 2.4x \)  
D) \( \hat{y} = 50 + 3x \)

Answer: A

Objective: (14.2) Determine Which Line Fits Data Points Better

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>4</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>11</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>

Line A: \( y = 1.0 + 2.2x \)  
Line B: \( y = 1.2 + 2.1x \)

A) Line A: \( \sum e^2 = 6.04 \)  
Line B: \( \sum e^2 = 5.17 \)  
Line B fits the set of data points better.  
B) Line A: \( \sum e^2 = 6.04 \)  
Line B: \( \sum e^2 = 5.17 \)  
Line A fits the set of data points better.  
C) Line A: \( \sum e^2 = 4.86 \)  
Line B: \( \sum e^2 = 4.70 \)  
Line B fits the set of data points better.  
D) Line A: \( \sum e^2 = 4.86 \)  
Line B: \( \sum e^2 = 4.70 \)  
Line A fits the set of data points better.

Answer: A

Objective: (14.2) Identify Outlier/Potential Influential Observation

Is the data point, \( P \), an outlier, a potential influential observation, both, or neither?

10)

A) Neither  
B) Both  
C) Potential influential observation  
D) Outlier

Answer: B

Objective: (14.2) Identify Outlier/Potential Influential Observation
Provide an appropriate response.

11) For which of the following sets of data points can you reasonably determine a regression line?

A) 2, 3, and 4
B) 2 and 3
C) All of the above
D) None of the above

Answer: B

Objective: (14.2) *Know Concepts: The Regression Equation

Compute the specified sum of squares.

12) The data below consist of test scores (y) and hours of preparation (x) for 5 randomly selected students. The regression equation is \( \hat{y} = 44.8447 + 3.52427x \).

<table>
<thead>
<tr>
<th>x</th>
<th>5</th>
<th>2</th>
<th>9</th>
<th>6</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>64</td>
<td>48</td>
<td>72</td>
<td>73</td>
<td>80</td>
</tr>
</tbody>
</table>

SSE
A) 87.4757  B) 96.1030  C) 599.200  D) 511.724

Answer: A

Objective: (14.3) Compute Sum of Squares SST/SSR/SSE
Solve the problem.

13) A study was conducted to compare the average time spent in the lab each week versus course grade for computer students. The results are recorded in the table below.

<table>
<thead>
<tr>
<th>Number of hours spent in lab</th>
<th>Grade (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>96</td>
</tr>
<tr>
<td>11</td>
<td>51</td>
</tr>
<tr>
<td>16</td>
<td>62</td>
</tr>
<tr>
<td>9</td>
<td>58</td>
</tr>
<tr>
<td>7</td>
<td>89</td>
</tr>
<tr>
<td>15</td>
<td>81</td>
</tr>
<tr>
<td>16</td>
<td>46</td>
</tr>
<tr>
<td>10</td>
<td>51</td>
</tr>
</tbody>
</table>

Find the coefficient of determination.
A) 0.017  B) 0.462  C) 0.335  D) 0.112
Answer: D

Objective: (14.3) Solve Apps: The Coefficient of Determination

14) The paired data below consist of the temperatures on randomly chosen days and the amount a certain kind of plant grew (in millimeters):

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>36</td>
</tr>
<tr>
<td>76</td>
<td>39</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>51</td>
<td>13</td>
</tr>
<tr>
<td>71</td>
<td>33</td>
</tr>
<tr>
<td>46</td>
<td>17</td>
</tr>
<tr>
<td>51</td>
<td>6</td>
</tr>
<tr>
<td>44</td>
<td>16</td>
</tr>
</tbody>
</table>

Find the SSR.
A) 242.951  B) 243  C) 0  D) 64.328
Answer: D

Objective: (14.3) Solve Apps: The Coefficient of Determination

Compute the specified sum of squares.

15) The data below consist of heights (x), in meters, and masses (y), in kilograms, of 6 randomly selected adults. The regression equation is $\hat{y} = -181.342 + 144.46x$.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.61</td>
<td>54</td>
</tr>
<tr>
<td>1.72</td>
<td>62</td>
</tr>
<tr>
<td>1.78</td>
<td>70</td>
</tr>
<tr>
<td>1.80</td>
<td>84</td>
</tr>
<tr>
<td>1.67</td>
<td>61</td>
</tr>
<tr>
<td>1.88</td>
<td>92</td>
</tr>
</tbody>
</table>

SSE
A) 100.06  B) 119.30  C) 979.44  D) 1079.5
Answer: A

Objective: (14.3) Compute Sum of Squares SST/SSR/SSE

Determine the percentage of variation in the observed values of the response variable that is explained by the regression. Round to the nearest tenth of a percent if needed.

16) x  | 5 10 4 6 10 9  
|-----|-----|
| y   | 64 86 69 86 59 87  
A) 67.8%  B) 5.0%  C) 22.4%  D) 0%
Answer: B

Objective: (14.3) Determine Percentage of Variation Explained by Regression
Compute the specified sum of squares.

17) The regression equation for the data below is $y = 3.000x$.

<table>
<thead>
<tr>
<th>x</th>
<th>2</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>7</td>
<td>11</td>
<td>13</td>
<td>20</td>
</tr>
</tbody>
</table>

SST

A) 92.25  
B) 10.00  
C) 88.75  
D) 78.75

Answer: C

Objective: (14.3) Compute Sum of Squares SST/SSR/SSE

Obtain the linear correlation coefficient for the data. Round your answer to three decimal places.

18) | x | 32.2 | 31.5 | 18.4 | 26.8 | 34.1 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

A) 0.625  
B) 0  
C) -0.556  
D) -0.625

Answer: A

Objective: (14.4) Obtain Linear Correlation Coefficient

19) | x | 57  | 53  | 59  | 61  | 53  | 56  | 60 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>156</td>
<td>164</td>
<td>163</td>
<td>177</td>
<td>159</td>
<td>175</td>
<td>151</td>
</tr>
</tbody>
</table>

A) -0.078  
B) 0.214  
C) 0.109  
D) -0.054

Answer: C

Objective: (14.4) Obtain Linear Correlation Coefficient

Provide an appropriate response.

20) The table below gives the career free-throw percentage and the player height for a sample of NBA basketball players, both past and present. Assuming that the data can be modeled with a linear model, use technology to obtain a residual plot.

<table>
<thead>
<tr>
<th>Height (meters)</th>
<th>Career Free-throw %</th>
<th>Height (meters)</th>
<th>Career Free-throw %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.83</td>
<td>76.0</td>
<td>2.18</td>
<td>72.1</td>
</tr>
<tr>
<td>2.16</td>
<td>54.2</td>
<td>2.08</td>
<td>69.2</td>
</tr>
<tr>
<td>2.13</td>
<td>71.0</td>
<td>2.01</td>
<td>58.4</td>
</tr>
<tr>
<td>2.26</td>
<td>81.1</td>
<td>1.60</td>
<td>82.7</td>
</tr>
<tr>
<td>2.11</td>
<td>75.6</td>
<td>2.06</td>
<td>88.6</td>
</tr>
<tr>
<td>2.01</td>
<td>78.2</td>
<td>2.03</td>
<td>84.8</td>
</tr>
<tr>
<td>1.83</td>
<td>90.4</td>
<td>2.21</td>
<td>64.9</td>
</tr>
<tr>
<td>1.98</td>
<td>82.1</td>
<td>2.29</td>
<td>56.1</td>
</tr>
</tbody>
</table>
Answer: A

Objective: (15.1) Tech: Analysis of Residuals