Homework #9a - Chapter 11 Regression & Correlation (Montgomery & Runger, 5ed)

1. Use the numbered textbook problems only as references to help add meaning to the data.
2. Do NOT solve the problems as stated in the textbook.
3. Use the methods discussed in class to find the following for each of the numbered problems.
   a. Calculate the correlation coefficient $r$.
   b. Determine whether or not there is significant correlation between the variables.
   c. Write the regression equation.
   d. Use the regression equation to determine the value of $Y$, given the value of $X$.

Page 411  #11-6  $X$ = Engine Displacement (cubic inches)  $Y$ = Mile per Gallons (mpg)

<table>
<thead>
<tr>
<th>n</th>
<th>$\sum X$</th>
<th>$\sum Y$</th>
<th>$\sum X^2$</th>
<th>$\sum Y^2$</th>
<th>$\sum XY$</th>
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<tbody>
<tr>
<td>21</td>
<td>5017</td>
<td>620.5</td>
<td>1436737</td>
<td>18986</td>
<td>138663</td>
</tr>
</tbody>
</table>

Predict MPG for an engine displacement of 150 cubic inches.

Answers:
- $r = -0.769$
- $t_{tost} = -5.24$
- $t_{\alpha/2} = \pm 2.093$
- $y = 39.2 - 0.0402 x$
- $y = 39.2 - 0.0402(150) = 33.2$ mpg

Page 412  #11-8  $X$ = Sound Pressure Level (dB)  $Y$ = Evoked Blood Pressure Rise (mm Hg)

<table>
<thead>
<tr>
<th>n</th>
<th>$\sum X$</th>
<th>$\sum Y$</th>
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</table>

Predict Blood Pressure (mmHg) for a Sound Pressure Level of 6.5 dB’s.

Answers:
- $r = 0.865$
- $t_{tost} = 7.314$
- $t_{\alpha/2} = \pm 2.101$
- $y = 64.3 + 4.29 x$
- $y = 64.3 + 4.29(6.5) = 92$ mm Hg

Page 412  #11-11  $X$ = Age (weeks)  $Y$ = Strength (psi)

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Predict Strength (psi) for an Age of 18.5 weeks.

Answers:
- $r = -0.9466$
- $t_{tost} = -12.46$
- $t_{\alpha/2} = \pm 2.101$
- $y = 2625 - 37 x$
- $y = 2625 - 37(18.5) = 1940.5$ psi

4. Rework each of the problems using the “Alternate Form”; of course you should obtain the same results!

<table>
<thead>
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<th>$S_{yy}$</th>
<th>$S_{xy}$</th>
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