Chapter 3 Review

At a recent teacher professional development day, I noticed that the number of teachers paying attention to the training was declining throughout the day. I collected the following data:

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td># people paying attention</td>
<td>80</td>
<td>68</td>
<td>62</td>
<td>50</td>
<td>48</td>
<td>32</td>
<td>21</td>
</tr>
</tbody>
</table>

1. Make a scatterplot of the data on your calculator and sketch it below.

2. Describe the data.
   There is a very strong, negative linear relationship between hours and # of teachers paying attention.

3. Find the line of best fit using the equations for a and b. Confirm that it matched with the calculator’s line of best fit.
   \[ \hat{y} = -9.39x + 79.75 \]
   \( \hat{y} \) = predicted # people paying attention
   \( x \) = hours

4. Make a prediction for the # of people paying attention at \( t = 2.5 \) hours.
   \[-9.39(2.5) + 79.75 = 56.28 \text{ people.} \]

5. What is \( r \)? Interpret.
   \(-0.99015\). There is a very strong (almost perfectly linear) correlation between time and # of people paying attention.

6. What is \( r^2 \)? Interpret.
   \( 0.9803 \)
   98.03\% of the variation in # of people paying attention is explained by the linear relationship with time.
7. What is the slope of the LSRL? Interpret in the context of the problem.

Slope: -9.39. One each additional hour that passes it is predicted that 9.39 fewer teachers pay attention on average.

8. What is the y-intercept of the LSRL? Interpret in the context of the problem.

y-int = 79.75. At the start of the day (hour = 0), 79.75 teachers are paying attention.

9. Identify the values a and b in the Minitab output:

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coef</th>
<th>SE Coef</th>
<th>T</th>
<th>P</th>
<th>b(y-int) = 79.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>79.75</td>
<td>5.34</td>
<td>3.41</td>
<td>0</td>
<td>a(slope) = -9.393</td>
</tr>
<tr>
<td>Time</td>
<td>-9.393</td>
<td>4.23</td>
<td>-15.81</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

S = 3.143  R-Sq = 98.0%  R-Sq (adj) = 97.2%

10. Interpret s = 3.143 in the context of the problem.

The LSRE mispredicts the # of teachers paying attention by 3.143 teachers on average.

11. Find the residual for a time of 4 hours.

\[ \hat{y} = 79.75 - 9.393(4) = 42.178 \]

resid = act - pred = 48 - 42.178 = 5.822

12. Make a residual plot on your calculator. Sketch it below.

13. Mr. Shinn walked into the meeting at t = 7 hours and all of a sudden 82 people were paying attention. Would this point be influential? Prove it.

At 7 hours, we would expect 79.75 - 9.393(7) 13.999 teachers to be paying attention. Mr. Shinn's presence inspired 68 more teachers than expected to pay attention.