Stat 6620 Homework 1  
Due: September 4, 2018

1. Show that

(a) \( \sum_{i=1}^{n} X_i Y_i - n \bar{X} \bar{Y} = \sum_{i=1}^{n} (X_i - \bar{X})(Y_i - \bar{Y}) \)

(b) \( \sum_{i=1}^{n} X_i^2 - n \bar{X}^2 = \sum_{i=1}^{n} (X_i - \bar{X})^2. \)

so that the normal equations reduce to Equations (1.10a) and (1.10b) on page 16 of textbook, i.e.

\[
b_1 = \frac{\sum_{i=1}^{n} (X_i - \bar{X})(Y_i - \bar{Y})}{\sum_{i=1}^{n} (X_i - \bar{X})^2}
\]

\[
b_0 = \bar{Y} - b_1 \bar{X}
\]

2. Using the data on page 37, Problem 1.42 with \( n = 6 \),

<table>
<thead>
<tr>
<th>Observation No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of galleys</td>
<td>7</td>
<td>12</td>
<td>4</td>
<td>14</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Cost of correcting errors ($)</td>
<td>128</td>
<td>213</td>
<td>75</td>
<td>250</td>
<td>446</td>
<td>540</td>
</tr>
</tbody>
</table>

(a) Calculate the regression equation for predicting the cost of correcting errors given the number of galleys. You may use a calculator or a computing application like R or Excel or SAS.

(b) On the average, the cost increases by $\underline{\phantom{0000}}$ for each additional galley.