STAT 217 – Quiz 23 (Analysis of variance)

Assigned on Wed Mar 11, due on Thur Mar 12. You may work with a group of as many as 4 students, submitting one quiz with all names, provided that you all contribute to the work. You may use your notes.

An article in the *Journal of the American Medical Association* reported on a randomized, comparative experiment in which 160 subjects were randomly assigned to one of four popular diet plans: Atkins, Ornish, Weight Watchers, and Zone (40 subjects per diet). These subjects were recruited through newspaper and television advertisements in the greater Boston area; all were overweight or obese with body mass index values between 27 and 42. Among the variables measured were:

- which diet the subject was assigned to
- whether or not the subject completed the twelve-month study
- the subject’s weight loss after two months, six months, and twelve months (in kilograms, with a negative value indicating weight gain)

The following graph presents boxplots of the weight loss amounts across the four diets:

1. What is the response variable in this graph?

2. Was this an observational study or an experiment?

Consider the following ANOVA output produced from the data graphed above:

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>diet</td>
<td>3</td>
<td>77.6</td>
<td>25.9</td>
<td>0.54</td>
<td>0.659</td>
</tr>
<tr>
<td>Error</td>
<td>89</td>
<td>4293.7</td>
<td>48.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>92</td>
<td>4371.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. State the null hypothesis, in symbols, to be tested with this ANOVA output.

4. Summarize your conclusion from this ANOVA output.

5. Is it valid to conclude that the Ornish diet causes a higher weight loss than the other diets? Explain briefly.