Please show all of your work. This is due on Monday, January 30 in class.

1) Exercise 9.16 (the data file). See below for some help on generating graphs, which may help with interpretation. Try hard to do part a before you do part b; the practice is worthwhile. For part b, be sure to do your best to interpret (i.e., describe) all main effects and the two-way interactions, but do not try to do any follow-up tests; unless you are feeling brave, don't try to interpret the three-way interaction. I don't want to see any output. Really. None.

Analyzing a three-factor design and generating graphs to examine potential interactions in SPSS

In a three-factor design (see threefactor.sav), go the Analyze menu and select GLM > Univariate. Select the DV (score in this case) and put it in the appropriate box, and then add the IVs (a, b, and c in this case) to the Fixed Factor(s) box. Click on Plots. Then, if you want (for example) ...

... a plot of the a effect, click on a, put it on the Horizontal Axis, and click Add.

... a plot of the ab interaction, click on a and put it on the Horizontal Axis, then click on b and give it Separate Lines, then click Add. (Alternatively, you could put a on separate lines and b on the x-axis.)

... a plot of the abc interaction, put a on the Horizontal Axis, b on Separate Lines, and c in Separate Plots, then click Add. (The roles of a, b, and c can be changed, of course, depending on what you want to see in your plots.)

When you've added all the plots you are interested in, click Continue. Before clicking OK to execute the ANOVA, I also recommend clicking on Options and asking for descriptive statistics. BE WARY OF SPSS's TERRIBLE, HORRIBLE, NO GOOD, VERY BAD HABIT OF GENERATING DIFFERENT SCALES FOR THE Y-AXIS! WHAT LOOKS LIKE A LARGE EFFECT MAY BE QUITE SMALL. LOOK AT THE Y-AXIS CAREFULLY.

Use the data at right for #2 and #3:

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28</td>
<td>32</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>31</td>
<td>35</td>
<td>39</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>37</td>
<td>44</td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>30</td>
<td>37</td>
</tr>
<tr>
<td>5</td>
<td>29</td>
<td>31</td>
<td>33</td>
</tr>
</tbody>
</table>

2) Treat the data above as if they were from a between-subjects design (with n = 5 per cell) and perform an ANOVA (use software). Hand in the ANOVA summary table.

3) Now treat the data above as if they were from a repeated-measures design, such that the first row represents Subject 1, the second row Subject 2, and so on. (The data have to be rearranged from #2 to #3.)

   a. Perform an ANOVA (use software) and hand in the ANOVA summary table.
   b. Find SS_A and SS SA by whatever means you can\(^1\).
   c. How are the various SSs from #2 related to those from #3? (What's the same? What's different? Do any two things add up to another thing? Et cetera.)
   d. Notice that the F-ratio is quite a bit larger in #3 than in #2. Say why, being sure to say something about the relationship between SS_{SA} from #2 and SS_{S} and SS_{SA} in #3.

---

\(^1\) Hint: Remember that SS_{total} is given to you by SPSS in output of a between-subjects ANOVA; that SS_{A} and SS_{SA} are given to you as part of the output of a within-subjects ANOVA; and that SS_{total} = SS_{A} + SS_{S} + SS_{SA}.