For each of the descriptions, identify the correct analysis from the following choices:

- a. Z-test
- b. Single sample t-test
- c. Independent samples t-test
- d. Dependent samples t-test
- e. One-way ANOVA
- f. Factorial ANOVA
- g. RM ANOVA – one-way
- h. Mixed model ANOVA

1. You are testing a new drug. You create three groups of volunteers. To group 1, you give a placebo, to group two, you give the recommended dose. To group three, you give twice the recommended dose. **E**
2. You are testing a new training regime. You place one group of students on a typical training program recommended by ACSM (the American College of Sports Medicine), and another on your new regime. Your measure is total strength score at the end of training. **C**
3. Last year the average age of statistics students was 19.03 years old. This year, with a new prerequisite, the age is expected to decrease. A sample of 40 students yielded a mean of 18.21 and a standard deviation of 4.97. **B**
4. Last year the average age of statistics students was 19.03 years old (the standard deviation was 4.3 years). This year, with a new prerequisite, the age is expected to decrease. A sample of 40 students yielded a mean of 18.21 and a standard deviation of 4.97. **A**
5. You are interested in the effect of time of day on student performance. You compare average GPA of all classes offered at 8am to average GPA for all classes offered at 2pm. **C**
6. You are testing a new diet, and its effectiveness in combination with some drug treatments. You take 36 students and place them on the Atkins diet. Within these 36 students, you assign 12 to a drug-placebo condition, 12 to low-drug dose condition, and 12 to a high drug-dose condition. You also take 36 students and place them on the South Beach diet. Within these 36 students, you again assign 12 to a drug-placebo condition, 12 to low-drug dose condition, and 12 to a high drug-dose condition. **F**
7. You want some evidence that people in your bowling class are improving. You take their average scores in the first class, the class before mid-semester break, and the last class of the semester. You want to analyze these scores for differences. **G**
8. You are interested in the effects of two types of aerobic training on cardiovascular fitness. You measure pre- and post training performance for each of two groups of individuals, one of whom trains using taught aerobics classes exclusively, while the other trains using aerobics videos exclusively. **H**

Things you should know (kind of a mini study guide – this is not everything you should know):

<table>
<thead>
<tr>
<th>Question</th>
<th>Slide set</th>
<th>Slide # ( audio clip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>When should you use the Huynh-Feldt adjusted F-test for RM ANOVA, and when the Greenhouse Geisser?</td>
<td>RM ANOVA</td>
<td>Slides 13-15</td>
</tr>
<tr>
<td>Why is the RM ANOVA more powerful than a non-RM ANOVA?</td>
<td>RM ANOVA</td>
<td>A lot of slides in the build up, but most simply in slide 21, clip 4, and slide 22.</td>
</tr>
<tr>
<td>Why is a dep. t-test more powerful than a independent t-test?</td>
<td>Dependent t</td>
<td>3</td>
</tr>
<tr>
<td>What follow ups are appropriate for an interaction in a 3 x 4</td>
<td>Either 4 one-way ANOVAs on the 3 level variable,</td>
<td></td>
</tr>
</tbody>
</table>
Factorial ANOVA follow-up tests, RM ANOVA

1. Open the data file “factorial example” on the data page of the class web site.
2. Run a factorial ANOVA, with all the appropriate options, using “anxiety” and “physarousal” as IV’s, and “puttsmade” as the DV.
   a. Would it be appropriate to adjust the DV in any way? If so, state why, and how. Yes – you could take square roots of the DV, because the homogeneity of variance assumption is violated.
   b. What are the significant effects of the analysis?
   Two main effects
   c. State which follow-ups would be appropriate, and run them. The only follow up test that would be suitable would be Tukey’s HSD on the physarousal variable – it’s the only one with more than two levels (the other variable has only two levels, and so does not need it)
   d. State the outcomes of these follow-ups. Moderate physarousal is associated with a higher number of putts made than is low physarousal.
   e. Should any effects be disregarded, in your opinion? If so, state which and state why. No – this question can only be relevant if there is a significant interaction – and there isn’t one here.
3. Run a factorial ANOVA, with all the appropriate options, using “anxiety” and “physarousal” as IV’s, and “worryscore” as the DV.
   a. Would it be appropriate to adjust the DV in any way? If so, state why, and how. No – the levene’s test is not significant here, so the homogeneity test is passed.
b. What are the significant effects of the analysis?
A main effect of anxiety, and a two-way interaction (both are similarly strong in terms of effect size).

c. State which follow-ups would be appropriate, and run them.
Here you would need to find out where the changes in worry due to anxiety differ according to the level of physiological arousal (or vice versa), so you need to slide up the data. Remember, split the data by one independent variable, and analyze by the other and the DV. Here we have 3 (PA) x 2 (ANX) analysis, so we can:

A. split by PA (a 3 level variable) and analyze differences at each level of PA across levels of anxiety, which would require 3 independent t-tests (with a Bonferroni adjusted alpha of .05/3 = .017) using anxiety as the IV and worry as the DV, OR

B. split by anxiety (a 2 level variable) and analyze differences at each level of anxiety across levels of physiological arousal, which would require 2 1-way ANOVAs (with a Bonferroni adjusted alpha of .05/2 = .025) using physiological arousal as the IV and worry as the DV

Of these, I prefer to use A, so that I don’t need to do follow-ups on the follow up ANOVAs.

d. State the outcomes of these follow-ups.
Having done that, it is apparent here that low anxiety is only associated with an increased worry score relative to high anxiety at moderate levels of physiological arousal. At both high and low levels of physiological arousal, there are no significant differences in worry scores associated with differences in anxiety level.

e. Should any effects be disregarded, in your opinion? If so, state which and state why.
Yes. The main effect of anxiety is superseded by the interaction in which it is also involved, implying that the differences in worry associated with anxiety level are not consistent across levels of physiological arousal. Thus it is not a genuine main effect (as shown by the follow-up results above).

4. Run a RM ANOVA using the first three variables (a, b, c) as the three levels of a repeated measures variable called “arousal”.

a. What result should you report? The Huynh-Feldt, the Greenhouse-Geisser, or the sphericity assumed one?
The H-F epsilon is less than .7 (just – it is .699), so the conservative G-G adjusted F and associated significance (p) should be reported (from the second row of the results table).

b. What is the outcome of the analysis?
It is significant.

c. Run the appropriate follow-up tests, and state the final patterns of significance.

The paired sample t-tests on comparisons a-b, a-c, and b-c (with Bonferroni adjusted alpha of .05/3 = .017) show that the significant differences lie between pairs a and c, and b and c (we are not told what these units or variables mean at this point).