1) College students participated in a driving simulation study to investigate night-driving reactions as a function of alcohol consumption and road conditions. Participants were divided into four groups that drank "cocktails" containing either no alcohol, 2 ounces of alcohol, 4 ounces of alcohol, or 6 ounces of alcohol. After 30 minutes, they began the driving simulation test. Each participant simulated a one minute drive on a straight road, a road with gentle curves, and a road with many sharp curves. Each simulated road contained the same road hazards. The number of accidents was measured.

   a) As described, is this an independent groups, repeated measures or mixed factorial design? ______ A mixed factorial design ______ (1 pt)

   b) Why? (1 pt) The independent variable of alcohol amount (4 levels) is an independent groups variable and the independent variable of road conditions (3 levels) is a repeated measures variable so together they make a 4X3 mixed factorial design (a mixed factorial design has both independent groups and repeated measures parts to it).

   c) Name the independent variables and their levels and the dependent variable in this experiment.

      (3 pts) Two independent variables: Alcohol level with 4 levels (0,2,4,6 oz) and Road conditions with 3 levels (straight, gentle curves, sharp curves). The dependent variable is the number of accidents.

   d) Using an independent groups design this experiment would have how many groups? _12_ (1 pt)

2) Define the following terms as was done on the lecture slides from class. Do not refer to the numbers on the inside or outside of a matrix as part of your definition!)

   a) The “main effects” in a factorial experiment? (2 pts) The effect each independent variable on the dependent variable averaged across all levels of the other independent variables.

   b) The “interaction effects” in a factorial experiment? (2 pts) The individual effects of each level of an independent variable at each level of the other independent variables.

3) What is the name of the design diagramed below? (1 pt) ______Pre-test Post-test design_______

   R O₁ X O₂
   R O₁ O₂

   R means? ______Random assignment of participants to groups______

   O₁ means? ______Pre-test measurement of the dependent variable______

   X means? ___Introduction of the independent variable manipulation

   O₂ means? ___Post-test measurement of the dependent variable______
4) Place the numbers in the proper matrix cells below, \( A1B1=30 \), \( A1B2=30 \), \( A2B1=20 \), \( A2B2=40 \). Next graph these 4 data points. Label correctly the two lines connecting points above A1 & A2 as B1 and B2. (2 pts for an accurate matrix and graph)

<table>
<thead>
<tr>
<th></th>
<th>B1</th>
<th>B2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>A2</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

Using the data and figures above:

a) Is there a main effect of A? (1 pt) **NO** How do you know? (1 pt) Both means (A1 and A2 are equal at 30)

b) Is there a main effect of B? (1 pt) **YES** How do you know? (1 pt) B1 mean is 25 and B2 mean is 35, they are unequal and therefore B2 had a greater effect than B1.

c) Is there an A X B interaction effect? (1 pt) **YES** How do you know? (1 pt) The graphed lines are not parallel they cross which indicates that the effect of one variable is different given the level of the other variable.

5) Describe (or use a diagram like in question #3) the Solomon four-group design. (2 pts)

```
Control
R   O2
R   O1

Experimental
R   X   O2
R   O1   X   O2
```

a) Explain how this design assesses the impact of pre-testing on the dependent variable? (3 pts)
Because both the control group and the experimental group each have a group that gets a pre-test and one that doesn’t. If you see a difference between the two groups in the control condition (let’s say the group that got the pre-test scored higher than the group that got the post-test only) we can say the higher score was due to the pre-test sensitizing the participants to the measurements. There were no other differences between the groups. If the two post-test measurements in the experimental group are also different (and the post-test scores are higher in the pre-tested group) we have confirmed the findings on pre-testing from the control groups. If the control group has equal post-test means but the experimental group has unequal post-test means we can say that the effects of the IV were influenced by the pre-testing. The overall effects of the IV are assessed by the differences between the averaged post-test scores of the control group compared to the experimental group. This design is interesting because it has pre-testing control groups inside both the experimental group and the control group.
6) Subdivide this box into a 3X2X4 matrix and correctly label the variables A1, A2, A3 & B1, B2 & C1, C2, C3, and C4 in the margins of the matrix. Put the letter X in cell A1B1C3 and the letter Y in cell A3B2C1. (6 pts) There should be 24 cells in the matrix.

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>A2</th>
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<tbody>
<tr>
<td>C1</td>
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<td>C3</td>
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<td></td>
<td>X</td>
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<td>C4</td>
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a) Describe how you would use a repeated measures design to study the effects of three levels of background noise on reading comprehension with 60 participants. (2 pts) In a repeated measures design, all participants get all levels of the independent variable. So in this study all 60 participants would first read a paragraph with no background noise and take a comprehension test over it (level 1), next they would read a comparable paragraph with a moderate level of background noise (say 15 db of noise) and take a comprehension test over it and finally they would read a third paragraph comparable to the first two with a high level of background noise (say 35 db of noise) and take a comprehension test over it. We would average the scores of all participants in each group and compare the three averages to see which condition produced the highest or lowest score.

b) Since order effects are a major weakness of the repeated measures design, name and describe two that might be found in this study. (2 pts) You could have a fatigue effect so by the time they got to the last reading they would be tired and their scores would be lower. You might get a practice effect so the scores got higher each time they read the paragraphs and took the tests because they got better at doing it with each condition. You could have a contrast effect so if they just finished reading in silence and now there was a loud noise in the background the condition that followed the silent one would always be the lowest because of contrast with the quiet condition.

c) What are two ways you control for these order effects? (2 pts) You might want to randomize the condition orders across all 60 participants so that every condition appeared in every order an equal number of times and every condition both preceded and followed every other condition. You could also have a long delay between conditions (like an hour or a day) so any carry over effects would be gone by the time they started the next condition. You could have them do a distracting or relaxing task in between the readings like watch a cartoon, listen to music or get a back massage :>.)
1) Interactions are often discussed in terms of a moderator variable. A moderator variable
   a) is a misleading variable.
   b) is a variable with only a moderate effect on the interaction.
   c) influences the relationship between two other variables.
   d) All of these

2) When a confounding variable is present in an experiment, one cannot tell whether the results were
due to the
   a) independent variable or the dependent variable.
   b) independent variable or the confounding variable.
   c) dependent variable or the interval variable.
   d) dependent variable or the participant variable.

3) An educational researcher examines the effect of speaker credibility on attitude change in
university and community college students. The PV in this design is
   a) speaker credibility.
   b) the educational researcher.
   c) the attitude change.
   d) type of student.

4) To study the effect of type of stimulus on memory recall, Hayden has participants receive either an
auditory or visual presentation of a poem. After the presentation, participants are asked to answer
several questions about the poem. Hayden has employed which type of experimental design?
   a) Posttest only
   b) Pretest-posttest
   c) Pretest only
   d) One-group posttest

5) Which of the following is a true of using repeated measure designs over independent group
designs?
   a) A repeated measures design requires more participants than independent groups.
   b) A repeated measures design is less likely to detect the effect of the independent variable.
   c) The researcher has greater control over participant differences.
   d) A repeated measures design decreases the likelihood of an order effect.

6) A researcher may design an experiment with more than two levels of the independent variable
because
   a) it may be difficult to provide information about the exact relationship between the independent
variable and the dependent variable.
   b) with only two levels of the independent variable, a curvilinear relationship cannot be detected.
   c) researchers are often interested in comparing more than two groups.
   d) All of these