Problem 1 (23 points) In our survey I asked you how much you exercise and how much you watch TV. Here’s the distribution of how many students answered these two questions where the columns are how much you watch TV and the rows are how much you exercise:

<table>
<thead>
<tr>
<th>Exercise &quot;Not at all&quot;</th>
<th>Just a little</th>
<th>A fair amount</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Exercise &quot;Very much&quot;</td>
<td>8</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

We’ll be testing the null hypothesis that how much students exercise is independent of how much TV they watch. For this hypothesis test, use an alpha value of $\alpha = 0.01$

Fill in the table below containing the expected frequencies if the amount of exercise is independent of the amount of TV watching. (3 pts each)

<table>
<thead>
<tr>
<th>How much do you watch TV?</th>
<th>Just a little</th>
<th>A fair amount</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise &quot;Not at all&quot;</td>
<td>1a Question 1</td>
<td>1b Question 2</td>
<td>1c Question 3</td>
</tr>
<tr>
<td>Exercise &quot;Very much&quot;</td>
<td>1d Question 4</td>
<td>1e Question 5</td>
<td>1f Question 6</td>
</tr>
</tbody>
</table>

1 g) (4 pts): Compute the value of Chi-squared for this hypothesis test

**Question 7**

1 h) (4 pts): Find the critical value of Chi-squared

**Question 8**

1 i) (3 pts): Choose your decision for this hypothesis test.

**Question 9**
Problem 2 (38 points) Suppose you want to see if your GPA at UW varies with where you like to sit in class. From our survey, you reported the where you like to sit in class the categories of "in the middle", "near the front" and "toward the back". Here are some statistics about your GPA at UW for these categories of where you like to sit in class:

<table>
<thead>
<tr>
<th></th>
<th>In the middle</th>
<th>Near the front</th>
<th>Toward the back</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>46</td>
<td>53</td>
<td>20</td>
</tr>
<tr>
<td>Mean</td>
<td>3.4193</td>
<td>3.5111</td>
<td>3.352</td>
</tr>
<tr>
<td>SS</td>
<td>4.9213</td>
<td>5.1739</td>
<td>1.5031</td>
</tr>
</tbody>
</table>

\[ n_{total} = 119 \]
\[ \text{grand mean} = 3.4489 \]
\[ SS_{total} = 12.0316 \]

Test the hypothesis that your GPA at UW varies with where you like to sit in class by filling in the summary table below. State your decision using APA format. Use \( \alpha = 0.05 \).

Calculate the values for an ANOVA and enter the values in the table below.

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>( F_{crit} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2a</td>
<td>2d</td>
<td>2g</td>
<td>2i</td>
<td>2j</td>
</tr>
<tr>
<td>Within</td>
<td>2b</td>
<td>2e</td>
<td>2h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2c</td>
<td>2f</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 k) (4 pts) Find the p-value for this hypothesis test

Question 20

2 l) (3 pts) Choose your decision for this hypothesis test.

Question 21
Problem 3 (6 points) Here’s a frequency distribution of your UW GPAs. Which measure of central tendency, mean or median, is smallest for this distribution?

Question 22
Problem 4 (20 points): Choose the hypothesis test (1-10 below) that is most appropriate for each of the following scenarios.

1) z-test

2) t-test for the mean of a single sample

3) t-test for the difference between means from two independent samples

4) t-test for the difference between means from two dependent samples

5) test for a correlation different from zero

6) test for a difference between two correlations

7) Chi-square test for frequencies

8) Chi-square test for independence

9) One-factor ANOVA

4 a) (4 pts) Your TA has measured the IQs of 25 professors. She wants to test the hypothesis that the mean IQ of professors is different from 100, knowing that the population standard deviation is 15 IQ points.

Question 23

4 b) (4 pts) A researcher has measured galvanic skin responses (GSR) in three groups: (1) subjects who just took a take-home stats final, (2) subjects that just took a nap, and (3) subjects that have been watching TV. She wants to test the hypothesis that there is a difference in the mean GSR across these three groups.

Question 24

4 c) (4 pts) A professor has counted the number of freshmen, sophomores, juniors and seniors that are in her statistics class. She wants to test the hypothesis that the students are distributed equally across the four categories.

Question 25

4 d) (4 pts) A professor gives each student two midterm exams in a quarter. She wants to see if there is a significant difference between the means for the two exams.

Question 26

4 e) (4 pts) A basketball statistician wants to know if the correlation between player salaries and field goal percentage is significantly greater than zero.

Question 27
Problem 5 (13 pts) Of the 74 students who chose a favorite spectator sport, the distribution is as follows:

<table>
<thead>
<tr>
<th>Observed frequencies of favorite sport</th>
<th>American Football</th>
<th>Baseball</th>
<th>Basketball</th>
<th>Soccer</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>6</td>
<td>23</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

You will test the null hypothesis that there your choice of favorite sports are equally distributed across the 4 sports using an $\alpha = 0.05$.

5 a) (4 pts) Calculate the value of Chi-squared

Question 28

5 b) (2 pts) Find the degrees of freedom

Question 29

5 c) (4 pts) Find the p-value for this hypothesis test

Question 30

5 d) (3 pts) Choose your decision for this hypothesis test.

Question 31