PROJECT: PHASE ONE - Data Collection and Data entry

Part 1a: (5 pts)

Choose a topic and create a 6 question survey asking questions to generate data for your topic. Of the 6 questions, 2 must be qualitative with only 2 category responses and 4 must be quantitative.
No email submissions. No late submissions. Must be typed. See schedule for due date
Many of you will be asked to resubmit your survey to address changes that need to be made.

Part 1b: Survey Distribution and Return (5 pts each)

You will make enough copies for everyone in the class to take your survey, as well as yourself. Please put your initials on the survey so that we know who gets the completed survey.
***************NOTE WELL:
If you do not hand out/pick up your surveys at your allotted class time or you do not complete all the surveys by the allotted class time, this will result in a grade of 0 for Phase 1b and you will have no data to complete the project**********************************.

PART 1c: Spreadsheet

Once you turned in your Minitab spread sheet depicting your data (paper or visual), you will have earned another 5 points for Phase 1.

DO NOT ASK THE FOLLOWING:

You must ask questions that will give you diversity in your responses. Questions such as age, number of credits taken, number of classes taken, years of college, class status, "Do you have a driver's license", "Do you have a cell phone", "Do you own an iPhone",etc have a strong probability that everyone will respond the same.

Don't ask questions that only select people can answer. This happens when you choose a non-inclusive topic, such as playing/following organized sports or asking follow-up questions about an experience someone may not have had

PHASE TWO: (20 points). All group member names are to be included on your submission.
Due Date: Friday 2/24/2023, at your class start time

Examining quantitative data for symmetry/skewness and outliers.
Examining qualitative data through pie charts.
It will be much easier to cut/paste all Minitab printouts to Word. You can shrink the size of the pie charts and histograms in Word to save paper.

Pie Charts, Descriptive Stats and Histograms

1. Using <u>attached directions</u>, you will need a pie chart for your 2 qualitative variables.

2. Using <u>attached directions</u>, you will need the following for each of your four quantitative variables: a histogram, and these stats: mean, median, coefficient of variation, maximum and minimum.

3. All graphs and descriptive stats must be printed out for full credit

Analyses

Part 1.

For each <u>pie chart</u>, you must make a simple statement about what you observe. For example, "67% of my respondents are female". This can be written/typed below the pie chart.

Part 2.

For each **quantitative variable**, you must a). analyze their respective histograms by making an observation about symmetry/skewness (if skewed, include the direction). In your analysis, **refer to and state the mean and median** to provide argument for your conclusion of symmetry/skewness, and b). for each histogram, make a statement about the presence or absence of outliers, <u>in your opinion</u>. State them. This is a subjective observation and **<u>requires no testing</u>**.

Part 3.

Using the coefficient of variation, determine which of your quantitative variables has the most consistent responses and which has the least consistent responses. **State these CVs**.

Please submit all graphs/printouts along with your analyses.
<u>Failure to staple your work incurs a 5 point penalty and late submissions are not allowed. No email submissions.</u>

Instructions for Pie Charts, Histograms (single or multiple), and Descriptive Statistics

Note:

- **When running any of these procedures and your screen for that process lists no variable (column) names, simply click in the box furthest to the right and the variable names will appear in the left box**
- **Column (variable) names can only be placed in the gray box directly below the cells that say "C1,C2,C3…"**
- **When you type in the data for a Qualitative variable, Minitab automatically changes the title column by adding "-T". For example, if C1 contains qualitative data, it will automatically change to "C1-T". However, if you are inputting quantitative data, the "-T" should not be there. It means you made a mistake and you can no longer use that column and must choose another column and re-type the data. *Do not cut and paste*. It does not work.**
- **To make data input easier, use a single letter for qualitative variables. For example, instead of inputting "male", use "m".**
- **To save your data, go to File -> save worksheet as -> give it a title and hit "save".**

1. **Minitab Instructions for ONE or MORE Pie charts:**

Graphs -> pie chart-> choose only qualitative variables
    Choose labels -> slice labels -> choose all options except "frequency" and then click on "Draw line to pie chart" on that same screen, Click OK and Click OK again

2. **Minitab Instructions for ONE Histogram**

Graphs ->histograms -> default is "simple" so click OK -> choose only quantitative variables -> click OK

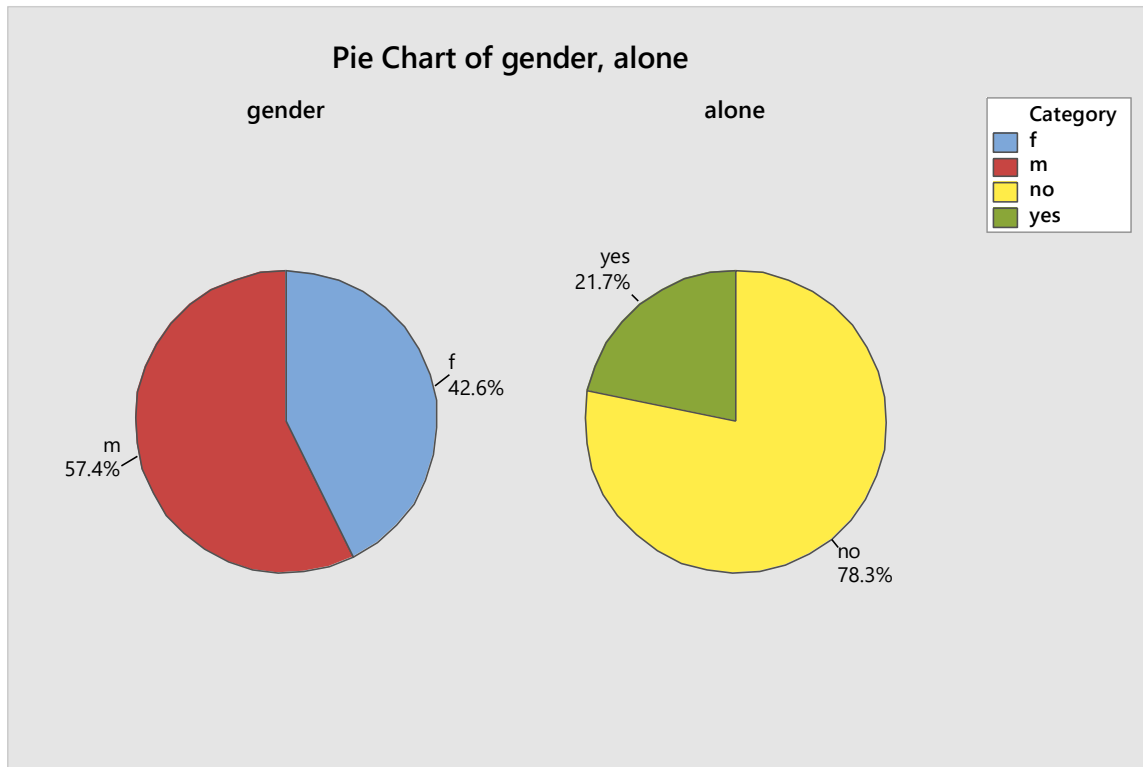3. **Minitab Instructions for MULTIPLE Histograms**

Graphs ->histograms -> default is "simple" so click OK -> choose only quantitative variables -> choose "multiple graphs" - > check "In separate panels of the same graph" -> click OK -> click OK

4. **Minitab Instructions for Descriptive Stats**

Stats -> basic Stats -> display descriptive stats -> choose only quantitative variables -> choose the Statistics option -> check off the statistics you want -> click OK ->

Example of Phase 2

**Part 1.** Pie Charts (you will have 2 of these)

Pie Chart of gender, alone

gender

alone

Category
f
m
no
yes

f
42.6%

m
57.4%

yes
21.7%

no
78.3%

Gender: 57.4 % of my responses were from males

Do you like being alone: 78.3% said no.

Part 2. Histograms and Observations (you will have *four* of these)

Descriptive Statistics: GPA, hrs_socsites (you will have 4)

```
Variable          Mean   CoefVar   Minimum   Median   Maximum
GPA             3.0788     13.86    1.8600   3.1000    3.9400
hrs_socsites     11.37    112.65      0.00     6.50     60.00
```


Histogram of hrs_socsites
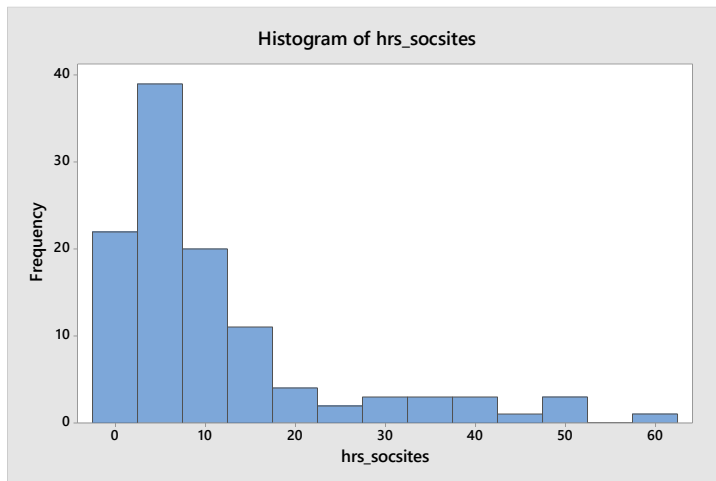
This histogram appears to be skewed right evidenced by the mean at 11.37 and the median at 6.5. I believe that there may be outliers at 40 and beyond.

Histogram of GPA
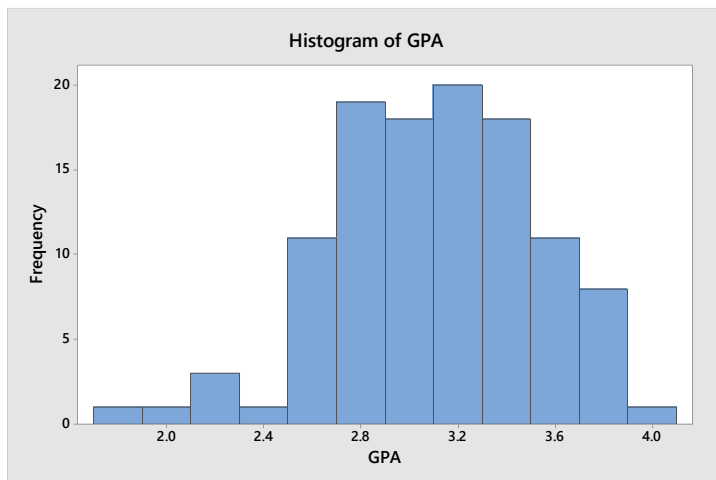
This histogram appears to be fairly symmetric as evidenced by the mean at 3.08 and the median at 3.9. I believe there are no outliers.

Part 3. The coefficient of variation for GPA is the lowest at 13.86%, making it the most consistent, and the highest coefficient of variation for hours using social websites, 112.65%, making it the least consistent.

PHASE 3:
Instructions to complete Phase 3 of the Project (20 points)
Due: 4/20/2023.
 No Late Submissions

Previously, you hypothesized what you believed the mean of 3 of your quantitative questions might be. To complete this phase, you will now conduct a one sample hypothesis test of means, using p-values to conduct these tests. You will perform 3 of them. Your goal is to determine if your guess was correct, using your sample as evidence.

Minitab Instructions to conduct a small sample tests of means.

1. From the top menu, choose Stats -> Basic Stats -> One sample t
2. From this new screen, move, from the left box to the right box, your first quantitative variable that you chose to use.
3. "One or more samples, each in a column" should be highlighted in the upper right box.
4. Check the box that says "Perform Hypothesis Test".
5. Where it says "Hypothesized Mean", enter your guess as to what the mean should be. This information is on the form you previously turned in.
6. The Minitab default is to perform a 2 sided test. Please leave this default. (It is under options, if you want to confirm a 2 sided test, but it is not necessary).
7. Click OK.
8. You will be performing steps 2 thru 8 three times, once for each question.
9. You will copy the information for each test onto the back of the form you previously handed in. You will copy the values from the Minitab printout to the back of your form for the following: sample size, sample mean and sample standard deviation.
10. You will then conduct your testing using <u>only</u> the calculations performed by Minitab. You can type the 4 steps out or handwrite the 4 steps out. Remember, this Phase is due today. All testing is done with **alpha=0.05.**

<u>**Example**</u>: From my project, I asked "What is your GPA?"
         I hypothesized the mean to be 3.22.

This is the Minitab printout from my test.

One-Sample T: gpa

Descriptive Statistics

N	Mean	StDev	SE Mean	95% CI for μ
5	3.160	0.254	0.114	(2.845, 3.475)

μ: population mean of gpa

Test

Null hypothesis	H_0: μ = 3.22
Alternative hypothesis	H_1: μ ≠ 3.22

T-Value	P-Value
-0.53	0.625

Here is my analysis using the Minitab printout. This is exactly what yours will look like (printed or handwritten) on the back of the Phase 3 form you previously created.

1. H_o: $\mu = 3.22$ H_a : $\mu \neq 3.22$
2. Reject Ho if p-value le alpha=0.05,   FTR Ho if p-value gt alpha = 0.05
3. t= -0.53, p-value=0.625
4. Since p-value = 0.625, we fail to reject Ho. We have evidence that my guess that the mean GPA is 3.22 was correct.

PHASE 4
Instructions for Phase 4 (40 points)

<u>Due</u>:_Tuesday, 5/3/2023 at the beginning of class .
No late submissions and no email submissions, under any circumstances. You must hand in output that looks **exactly** like the example given in class. It must be in the same order. **Do not use a separate piece of paper on which to write your analyses.**

<u>General Instructions</u>: Your project is to run variance tests and t-tests on your 4 quantitative variables based on your 2 qualitative variables.

Specifically, you will 1. Choose one of your qualitative variables and run 2 variance/t-tests on 2 different quantitative variables, 2. Choose your second qualitative variable and run 2 variance/t-tests on 2 different quantitative variables, not used in #1.

Summarizing: Qualitative var #1 with 2 different quantitative vars
                    Qualitative var #2 with 2 different quantitative vars not used for variable #1.

Therefore, you will be posing and running 4 variance/t-tests combinations in total with your results in the **exact format** as the example you were given in class. You will number your tests, followed by the question you are posing (handwritten in your own words) and answering, followed by the appropriate Minitab output with the handwritten or typed 4 step analyses next to it. For all tests, use alpha = 0.05 for p-value comparison.

Minitab Instructions:

  To run each of the six tests requires you to perform two routines on Minitab.

    Routine one: testing variances
        Go to Stats -> Basic Stats -> choose the "2 variances" option from the drop down menu.
            For the "sample" box", choose your quantitative variable and for the "sample id" box, choose your qualitative variable. Then click on the "graphs" box, and **UNCLICK** the "summary plot" option. Click OK -> click OK and the test will run.

     Routine two: testing the mean differences
        1). Go to Stats -> Basic Stats -> choose the "2 sample t tests" option from the drop down menu.
             For the "sample" box", choose your quantitative variable and for the "sample id" box, choose your qualitative variable.
        2). **Only do this step if you are assuming equal variance (you are assuming equality of variances if you FTR H_0 in step (1). Otherwise skip this step and go to (3).**
             Click on the "options" box and click the "Assume equal variances" option. Click OK.
        3). Click OK.

  *****You will be doing the above routine four different times.*