Turn in the graphs you made for ALL three parts in this assignment.

For each graph, make sure the following components are in the printout:

1. Title for the graph
2. Labels for x and y axes (along with appropriate units when applicable)
3. Line equation and R^2 when appropriate

PART 1: Simple Linear Plot

- Which set of data is plotted on the y-axis?
  - Volume (L)
- Which set of data is plotted on the x-axis?
  - Temperature (K)
- Record the following information:
  - The equation of the fitted trendline: y=0.1078x-8.0933
  - The value of the slope of this line: 0.1078
  - The value of the y-intercept of this line: -8.0933
- Is the fit of the trendline to your data good (circle one)? YES / NO. Explain why you think the line is a good fit to the data.
  - Yes, all the data points are linear and the points align in the best fit trendline.
- Determine the temperature (in K) of the gas in the cold room when it has a measured volume of 10.5 L using:
  - Extrapolation and “eyeballing”: 180 K
  - The equation of the trendline (show your calculations below): 172.47 K

$$10.5\,L = 0.1078\,x - 8.0933$$

$$\frac{10.5 + 8.0933}{0.1078} = \frac{0.1078\,x}{0.1078}\quad x = 172.47\,K$$

PART 2: Two Data Sets and Overlay

- Record the equations of the trendlines fitted to
  - Data set A: y=1.076x-0.059
  - Data set B: y=-3.28x+3.2375

- Perform a simultaneous equations calculation to determine the x and y values for the point of intersection between these lines. Show your work below:

Data set A: $y=1.076\,x-0.059$ *Data set B*: $y=-3.28\,x+3.2375$

<u>To Find x:</u>

$1.076\,x-0.059=-3.28\,x+3.2375$

$-0.059-3.2375=-3.28\,x-1.076\,x$

$\frac{-3.2965}{-4.356}=\frac{-4.356\,x}{-4.356}$ $\boxed{x=0.756}$

<u>To Find y:</u>

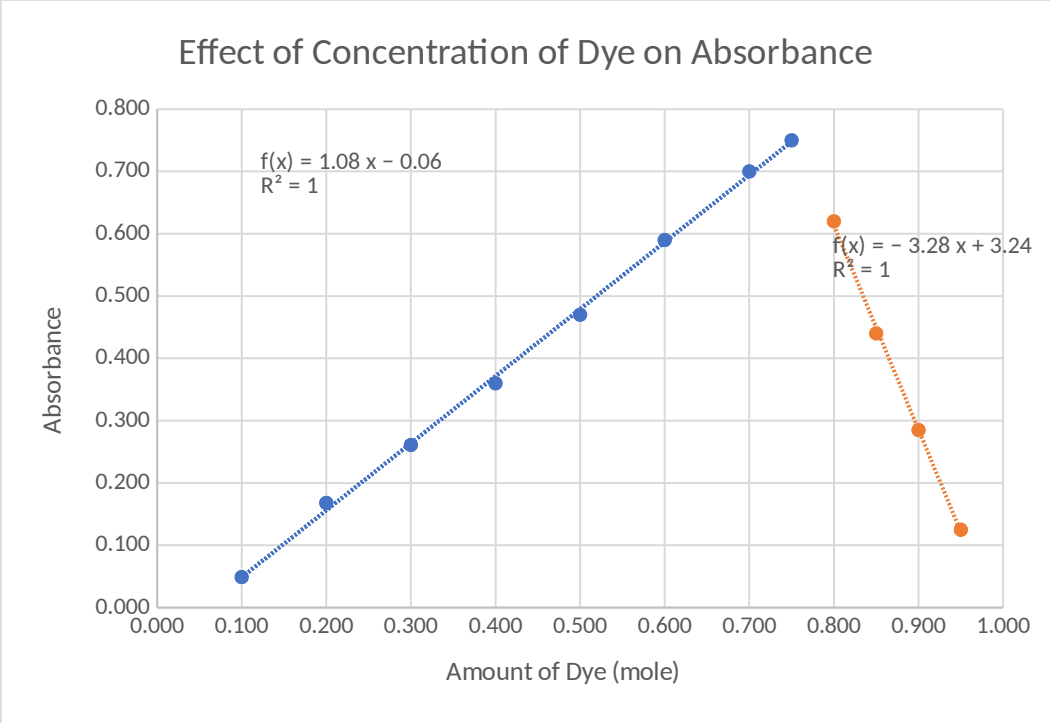
$y=1.076\,x-0.059\,(x=0.756)$

$y=1.076\,(0.756)-0.059$

$y=0.754$

$$Point\ of\ Inetrsection:(0.756,0.754)$$

Scatter Plot for Part 2:

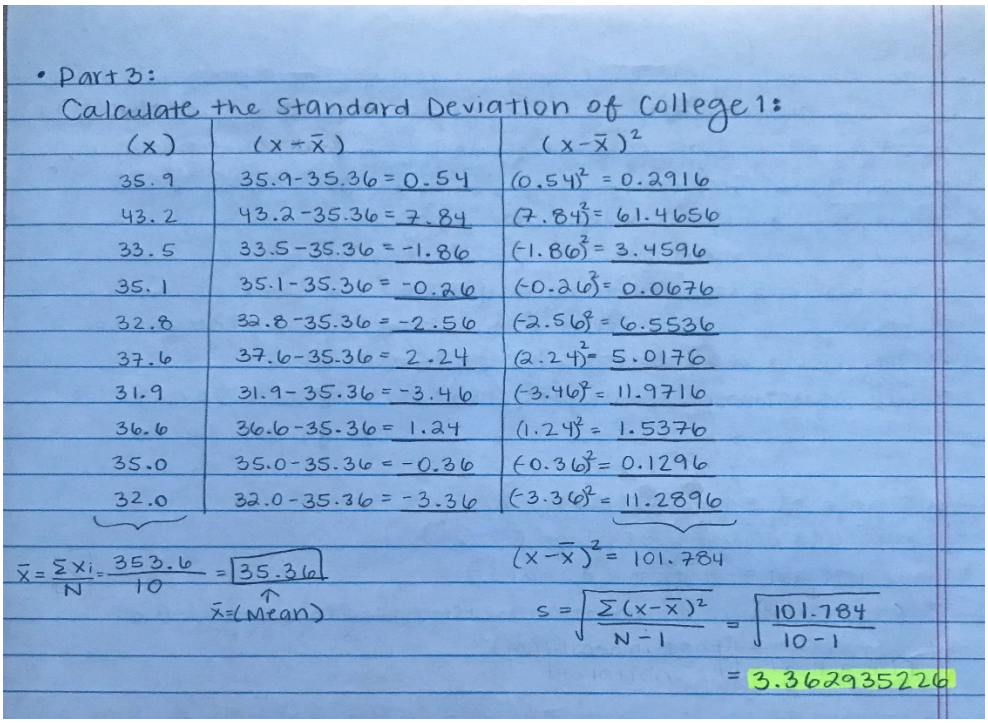


PART 3: Statistical Analysis and Simple Scatter Plots

- For the College #1 data set, record the following values (determined using Excel):
  - The mean SO_4^{-2} concentration: <u>35.36</u>
  - The median SO_4^{-2} concentration: <u>35.05</u>

- The standard deviation in the data set: 3.362935

- Calculate the standard deviation in the College #1 data set *by hand*. Show *all* your work below. Continue your work on an attached page if you require more space.



• Part 3:
Calculate the Standard Deviation of College 1:

(x)	$(x-\bar{x})$	$(x-\bar{x})^2$
35.9	35.9-35.36 = 0.54	$(0.54)^2$ = 0.2916
43.2	43.2-35.36 = 7.84	$(7.84)^2$ = 61.4656
33.5	33.5-35.36 = -1.86	$(-1.86)^2$ = 3.4596
35.1	35.1-35.36 = -0.26	$(-0.26)^2$ = 0.0676
32.8	32.8-35.36 = -2.56	$(-2.56)^2$ = 6.5536
37.6	37.6-35.36 = 2.24	$(2.24)^2$ = 5.0176
31.9	31.9-35.36 = -3.46	$(-3.46)^2$ = 11.9716
36.6	36.6-35.36 = 1.24	$(1.24)^2$ = 1.5376
35.0	35.0-35.36 = -0.36	$(-0.36)^2$ = 0.1296
32.0	32.0-35.36 = -3.36	$(-3.36)^2$ = 11.2896

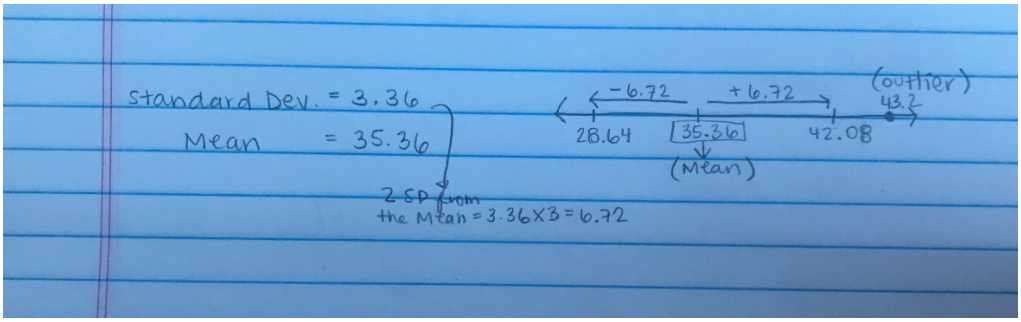
$\bar{x} = \frac{\Sigma x_i}{N} = \frac{353.6}{10} = 35.36$ ($\bar{x}$=(Mean))

$(x-\bar{x})^2 = 101.784$

$s = \sqrt{\frac{\Sigma (x-\bar{x})^2}{N-1}} = \sqrt{\frac{101.784}{10-1}}$

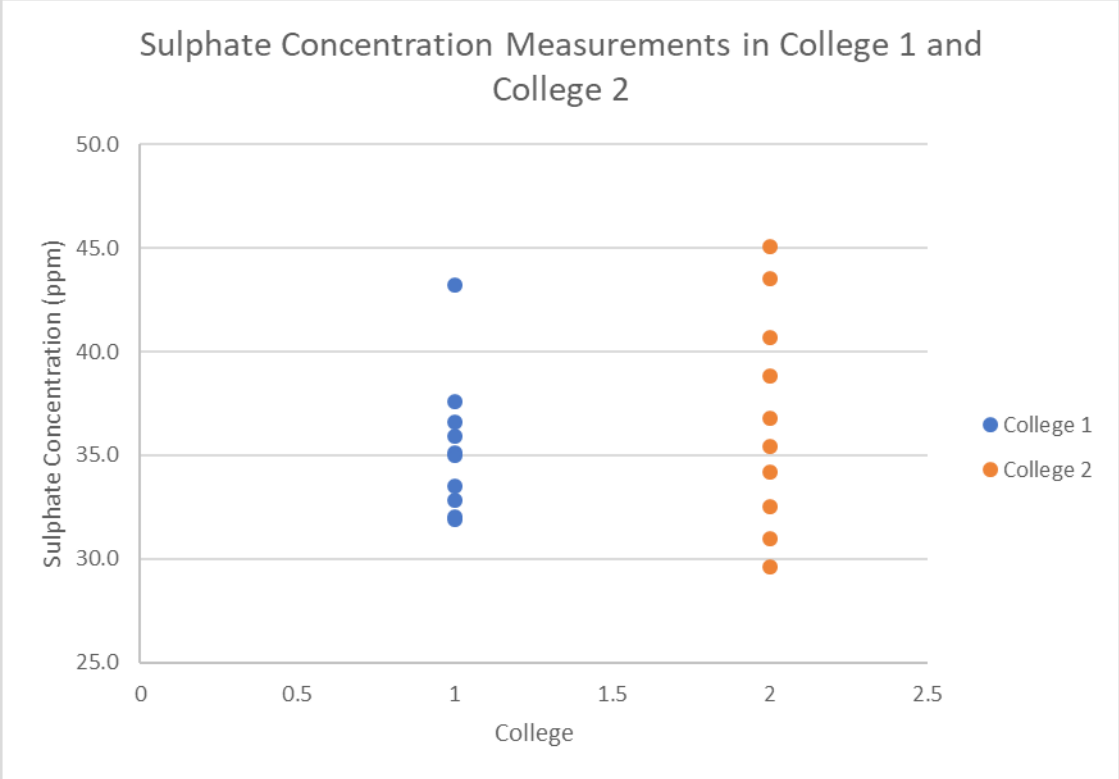
$= 3.362935226$

- Are there any outliers in the College #1 data set? YES / NO
- If yes, which measurements are the outliers? 43.2
- Show the calculations you used to identify the outliers (or, if none, how you determined that there were none).



- Re-calculate the following values (using Excel) *excluding the outliers:*
  - The mean SO_4^{-2} concentration: 34.49
  - The median SO_4^{-2} concentration: 35.0
  - The standard deviation in the data set: 2.045999

- Create a scatter plot showing both the College #1 and College #2 data. Attach a printout of your graph to this report. Be sure that your axes are properly labeled, and that your graph has an appropriate title.



- Examine your plotted data. Which data set:
  - Has a larger standard deviation? College 2
  - Contains the more precise measurements? College 1