

Name:

Class days and time:

Student Number

Graded Assignment 1

Neatness counts on all assignments, as does the quality of your writeups. Staple your pages! Write on one side. Please ask me about any parts that you find confusing and/or wrong.

1) **Problem:** Make sure that your student number is easily readable. Choose one of the columns below using the second to last digit of your Student Number. Example: Ima Badrisk has student number 123456; so she picks column x5. Using the computational formula, find the **sample standard deviation** of the data in the column that you have chosen: Also find the median and the third quartile. **Show your work!** Write on one side of the paper.

Row	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9
1	2.3	8.8	12.1	5.7	16.0	11.4	3.3	-2.5	6.7	3.0
2	7.9	2.9	3.6	5.7	3.5	-4.6	3.5	1.6	1.7	5.3
3	11.5	2.5	1.8	2.8	-1.7	4.7	12.2	2.7	2.0	1.1
4	2.1	6.5	9.9	2.9	6.8	-2.7	-1.6	-0.8	10.5	6.0
5	9.1	3.4	9.8	1.2	8.9	-3.6	7.1	-0.3	4.6	8.9
6	5.8	-3.6	6.8	6.8	4.1	-0.5	4.1	3.0	11.3	7.4
7	2.7	3.4	3.9	0.3	-2.9	-1.2	0.1	0.3	6.7	1.2
8	12.0	-1.5	9.9	9.6	15.5	-2.6	7.1	10.6	4.1	0.6
9	0.6	11.5	8.2	3.8	1.9	13.4	-1.5	4.9	5.2	4.2
10	-8.7	16.1	14.1	0.7	-0.9	0.5	1.0	3.3	3.7	7.1
11	4.1	4.6	6.8	9.3	3.0	3.2	6.2	14.8	9.9	5.0
12	-0.6	1.4	13.9	9.4	2.8	9.1	1.7	17.4	4.9	-2.5
13	-0.4	4.4	6.7	6.1	4.1	0.8	-2.3	9.5	9.7	8.8

To get credit for the remainder of this assignment you must turn in original spreadsheets.

2) This **Computer Assignment** has as its goal to do most of Problem G3 (not G3A) using Excel. **Problem G3 appears on page 69 of the Supplementary Materials and Tables** and a solution has been posted.

Step 1: Open up an Excel worksheet and start by filling locations A1-14 by labeling the column with: the word "Class" in A1, the labels for the classes in A2 to A13, the word "Total" in A14. If you have trouble with some of these labels, using single quotes can help.

Step 2: Put the abbreviation "Mdpt" for midpoint in B1. Fill Column B with the midpoints for the classes by putting 2.5 in B2 and 7.5 in B3. Highlight B2 and B3 and drag the fill handle down to fill the cells down to B13. (To do this point to the highlighted area until you get a black cross, then move the pointer down.) You should now have the numbers 2.5 to 57.5 in column B.

Step 3: You now need the frequency column. Put "f" in C1. Copy the frequencies in C2 through C13. Highlight cell C14 and find the AutoSum logo, which is simply a summation sign (\sum) on the top. Click on the summation sign and "enter." This will give you the sum of the frequencies. Remember that $\sum f = n$.

Step 4: Now compute the cumulative frequencies in column D. Head the column with "F" and copy the **number** from C2 to D2. In D3 put "=D2+C3." In D4 put "=D3+C4." Now highlight D3 and D4 and use the fill handle to fill in D5 through D13. The last cumulative frequency in D13 should be 90.

Step 5: Label column E with "xf" or "fx." To compute this column, put "=B2*C2" in E2 and "=B3*C3" in E3. Use the fill handle to fill in the rest of the products down to E13. Use the AutoSum feature to put a total $(\sum fx)$ in E14.

Step 6: In column F you will compute $x^2 f$ or fx^2 . Label the column "xsqf" or "fxsq." Now F2 will be done with "=B2*E2," and F3 with "=B3*E3" and you can fill the column down to F13 with the fill handle, and get its sum $(\sum fx^2)$ using AutoSum.

Step 7: Now compute the mean, variance and standard deviation using the computational formulas. In K1 put the words "n =" and copy n into L1, perhaps by writing "=C14" in L1. In K2 put the words "Mean =" and in L2 compute $\bar{x} = \frac{\sum fx}{n}$ by using "=E14/C14." Now you are ready to do

$s^2 = \frac{\sum fx^2 - nx^2}{n-1}$. Put "Var =" in K3. Remember that $\sum fx^2$ is in F14, n is in C14 and \bar{x} is in

L2. You should compute \bar{x}^2 by multiplying the mean by itself, so the formula in L3 should be "= (F14-C14*L2*L2)/ (C14-1)." You should get 132.5843.

Now you need the standard deviation, which is simply the square root of the variance, so put "StDev =" in K4 and "=SQRT (L3)" in L4.

Step 8: Now we are going to use the definitional formula to compute the skewness. Start by writing the value that you got for the mean in cell M2. Do not copy this value or use an equation to get it into M2, just type it in. Excel will mess up some calculations if you do. Use the fill handle to fill the M column with the mean.

You are now going to compute $(x - \bar{x})$, $f(x - \bar{x})$, $f(x - \bar{x})^2$ and $f(x - \bar{x})^3$ in columns G, H, I and J. Head these columns with "x'," "fx'," "fx'sq" and "fx'cu." In G2 enter "=B2-M2" and use the fill handle to put the values of the midpoints minus the mean in G2 through G13. In H2 enter "=G2*C2," use the fill handle to fill in to H13 and use AutoSum to put the sum of column H in H14. This sum should be zero. In I2 enter "=G2*H2" and use the fill handle again. In I14 get $\sum f(x - \bar{x})^2$. You can use this to check the accuracy of your variance computation. In J2 enter "=G2*I2" and again fill the column. Use AutoSum to get $\sum f(x - \bar{x})^3$ in J14. Then in cell K5 type "K3 =" and in L5 compute

$k_3 = \frac{n}{(n-1)(n-2)} \sum f(x - \bar{x})^3$ by typing "=C14*J14/((C14-1)*(C14-2))

Step 9: Use the formatting toolbar to center the first row of columns B through J. Make any other formatting changes that you think would improve the legibility of the spreadsheet and print out the results.

3) **Research Assignment.** Talk to about 20 students. Ask them how many hours they studied over the last week. Use Excel to analyze your data. Put a heading in cell A1 and your data below it. Use the "Tools" pull-down menu. Pick "Data Analysis" and "Descriptive Statistics." (If you cannot find this, use Tools and Add-Ins to put in the analysis packs.) Check "Labels in First Row." and "Summary Statistics." Specify a range (like A1: A50) Comment on the output in a short paragraph. Are you close to the mean? Why or why not. The skewness statistic computed here is K3, so compute a measure of relative skewness and tell me if the data is highly skewed and in what direction. Write in brief literate English!

4) **Extra Credit** (Don't ask me for extra credit after you get a final grade that you don't like. This is all there will be.)

Do Problem G3 (from the Supplement problem list).in Minitab. Minitab is available in most of the basement rooms in Anderson. If you want to try this, bring your difficulties to my office hours. If you wish to rent, borrow or buy Minitab for your own computer, see 'Minitab Options' at the end of this document.

The instructions there are a bit obsolete, but they still seem to work. Minitab works a lot better than Excel so you can do all the computations in both the definitional and computational versions of the problem. Here are the instructions for Problem G3. You must enter Minitab. Make sure that, in the 'editor' pull down menu, 'output editable' and 'enable commands' are checked. If you don't see these, put your cursor in the 'session' window and pull down 'editor' again.

In the Data part of the Minitab screen, label the columns in the part of the spreadsheet above the regular column locations.

Column 1 is "f", Column 2 is "x", C3 is "fx", C4 is "fxsq" C5 is "fxcu", C6 is "x^", C7 is "fx^", C8 is "fx^sq", C9 is "fx^cu", C10 is "class". Fill rows 1-12 in C10 with the range of the classes (i.e. 0-4.9, 5-9.9) to serve as row labels. Fill rows 1-12 in C1 with the frequencies and rows 1-12 in C2 with the midpoints (2.5, 7.5 etc.).

There are 2 ways to go from here:

The Hard Way

Step 1: In the session window, put in # followed by your name. '#' tells the computer that this line can be ignored. Press 'enter'. Make sure that you see the MTB> prompt.

Step 2: Go to [PROGRAMS](#) on the website. Click on 'Programs for grouped data computation.' Print out the document with the three programs 'grp', 'grpv', and 'grps'

Step 3: In the session window, go through these programs in sequence line by line. You should see evidence that the program has been executed in the session window and the work sheet.

Step 4: Print out your session window. Even better, after you print the window, use 'copy' and paste to move the results into Word and edit the output using the Microsoft equation 3.0 material in the original 251proggrp as labels for the columns and other items in the Minitab data display. Tell me what the mean, variance and standard deviation were and whether the measures of skewness say it is skewed to the left or the right.

Make sure that you print out your output. Tell me what the mean, variance and standard deviation were and whether the measures of skewness say it is skewed to the left or the right.

The Easy Way

Step 1: In the session window, put in # followed by your name. '#' tells the computer that this line can be ignored. Press 'enter'. Make sure that you see the MTB> prompt.

Step 2: Go to [PROGRAMS](#) on the website. Click on 'Programs for grouped data computation.' Print out and save the document with the three programs 'grp', 'grpv', and 'grps'

Step 3: Find the three programs 'grp', 'grpv', and 'grps'. In sequence 'copy' them and 'paste' them into the session window. After each 'paste' do an 'enter'. You should see evidence that the program has been executed in the session window and the work sheet.

Step 4: Print out your session window. Even better, after you print the window, use 'copy' and paste to move the results into Word and edit the output using the Microsoft equation 3.0 material in the original 251proggrp as labels for the columns and other items in the Minitab data display. Tell me what the mean, variance and standard deviation were and whether the measures of skewness say it is skewed to the left or the right.

Play with Microsoft Equation 3.0. You can move equations as pictures, or you can click on an equation and a toolbar will appear. To write your own equations, use the 'insert' pulldown menu and click on 'object' and then on 'Microsoft Equation 3.0.' You navigate using the arrows and tab. To put in spaces use the second box from the right. Use the brackets and parentheses on the toolbar. If you think that you can use it put an icon for it ' $\sqrt{\alpha}$ ' on your toolbar.

Minitab Options

The simplest way to get a copy of Minitab for your own computer is to go to [MINITAB Release 14 Demo](#) (Download a **free**, fully functional, 30-day demo version of MINITAB Release