

Homework instructions:

You are responsible for this information.

General instructions to be followed on **all** future homework assignments:

1) **You must do all of the work on your own.** While studying together is encouraged, copying work or providing answers is a violation of the honor code (see warning below).

2) **Clearly circle all final answers!!** Your recitation instructor doesn't want to look through lots of stuff to figure out where you put your answer.

3) **Do problems in order** - i.e., hand in your assignments with your problems in the same order as on the assignment sheet (otherwise your instructor may assume you didn't do a problem).

If you accidentally do get something out of order, please LABEL THIS CLEARLY!

4) **Please write neatly.** It doesn't have to be perfect, but it shouldn't be impossible to read. Your instructor will mark problems wrong if he or she can't read your writing!

5) **Show your work.** If you don't show all your steps, you may not get any partial credit because it'll be impossible to figure out where you made a mistake (and how bad it was).

6) **Use R only for those problems which say to use R.**

7) **Read these instructions again!**

Copying answers from other students, web sites, or from previous classes is a violation of the honor code!

Homework # 1

1) You have the following data: 7.8 17.2 19.1 9.2 18.4

Calculate the following:

a) $\sum_{i=1}^n y_i^2$ b) $\left(\sum_{i=1}^n y_i\right)^2$ c) $\sum_{i=1}^n (y_i - \bar{y})^3$ d) $\sum_{i=1}^n (y_i - \bar{y})^4$

e) $\sum_{i=1}^n (y_i - \bar{y})^2$ f) $\sum_{i=1}^n y_i^2 - \frac{\left(\sum_{i=1}^n y_i\right)^2}{n}$

g) Note the answers to (e) and (f). **Are you surprised?** The formula in (f) is a slightly easier way to calculate the SS, but because it often causes computational errors we prefer (e).

2) Suppose we have the following measurements for the numbers of red blood cells (RBC's) in 5 men (measured in millions of RBC's per μl):

5.9 6.5 6.0 5.6 6.1

a) Calculate the sample mean.

b) Calculate the sample median.

3) Refer to problem 2. Suppose we add another man with a RBC count of 1.0 .

a) Calculate the sample mean of this new sample.

b) Calculate the sample median of this new sample.

c) Which statistic (mean or median) do you think better represents this new sample of 6 men? **Why?**

4) Make up a sample of size $n = 6$ for which the average is -17 (note the $(-)$ sign). Not all 6 numbers should be identical.

5) Here are the weights of 7 female leopards (in kg):

33.0 38.7 56.2 35.5 38.6 46.2 37.9

- a) Calculate the sample mean and the sample median
- b) Calculate the Sum of Squares (SS)
- c) Calculate the sample variance (s^2)
- d) Calculate the sample standard deviation (s)
- e) Calculate the average absolute deviation

6) Subtract 8 from each of the numbers in problem 5 (i.e., you now have 25.0, 30.7, ... etc.).

- a) Calculate the sample variance (s^2)
- b) Are you surprised by the results? *Why or why not?*
- c) What happens to the mean? (You don't need to do the actual calculation unless you're not sure what's going on).
- d) What happens to the median? (Again, you don't need to do the calculation unless you're not sure what's happening)

7) Here are some body temperatures in °K (no one in their right mind would use degrees Kelvin for body temperature):

310.19 311.49 310.13 311.02 309.99 310.00 308.93

- a) Calculate the mean, variance and standard deviation.
- b) Now convert these readings to °F. To convert, remember that $^{\circ}\text{F} = (^{\circ}\text{K} \times 1.8) - 459.67$

For example, to convert the first reading ($^{\circ}\text{K} = 310.19$) you would do:

$$(310.19 \times 1.8) - 459.67 = 98.67$$

- c) Calculate the mean, variance and standard deviation of the converted data.

(Don't forget to answer the questions below).

- d) take the mean you calculated in (a) and convert this to Fahrenheit using the same formula you used in (b). *Are you surprised by the results? Why or why not?*
- e) take the standard deviation from (a) and multiply it by 1.8. *Can you explain the results? Why didn't you have to subtract 459.67? Watch your math in this step!*

(If you're puzzled by some of this, you should review your answers to question 6)

8) Here are some data on the heights in feet of 31 black cherry trees. This is actually part of one of the built in data sets in R (there are many data sets built into R).

70 65 63 72 81 83 66 75 80 75 79 76 76 69 75 74 85 86 71 64 78 80 74
72 77 81 82 80 80 80 87

a) Make a stem and leaf plot of these data (do **not** use R).

b) Make a histogram of these data (do **not** use R).

Be prepared to discuss these problems in recitation Wednesday, June 4th . Problems not discussed in recitation are due at the end of recitation.