

Review for Exam 2

Recall that your exam is on Wednesday, April 2 (Section 001: Thursday, April 3) in class. Calculators WILL be allowed on the exam. No notes or crib sheets or texts or other references will be allowed. If you understand and can do all assigned homework problems, all in-class worksheet problems, and all problems on this handout, you should do fine.

IMPORTANT NOTE: on the exam, you will be asked to SHOW YOUR WORK. Get into the habit of doing so here, if you have not already.

1. Draw a histogram for the following data set:

Range	Frequency
6–8	3
9–11	6
12–14	4
15–17	2

Label your axes, as well as the histogram itself.

2. Consider the following set of quiz scores (possible scores are 0, 5, 10, 15, 20, 25):

Score	Frequency
0	1
5	2
10	4
15	9
20	7
25	3

(a) Draw a histogram for the data. Label your axes as well as the histogram itself.

(b) Compute the mean \bar{x} and standard deviation s . Plot, on the axes of your above histogram, the points \bar{x} , $\bar{x} - s$, $\bar{x} + s$, $\bar{x} - 2s$, $\bar{x} + 2s$, $\bar{x} - 3s$, $\bar{x} + 3s$.

(c) What percentage of the data lies in the interval $(\bar{x} - s, \bar{x} + s)$? in the interval $(\bar{x} - 2s, \bar{x} + 2s)$? in the interval $(\bar{x} - 3s, \bar{x} + 3s)$?

3. Always, Sometimes, Never. Put an “A,” “S,” or “N” in the space next to each statement, according to whether the statement is Always, Sometimes, or Never true.

_____ The mode (if there is one) of a data set *equals* an actual data value.

_____ Adding a fixed nonzero number d to each observation in a set of data changes the mean.

_____ Adding a fixed nonzero number d to each observation in a set of data changes the median.

_____ Adding a fixed nonzero number d to each observation in a set of data changes the mode.

_____ Adding a fixed nonzero number d to each observation in a set of data changes the standard deviation.

_____ The median *equals* an actual data value.

_____ The mean *equals* an actual data value.

4. The mean of the first 12 observations in a data set is 5; the mean of the next 28 observations is 10. Find the mean of the 40 observations taken together.

5. Suppose, due to an error, a certain boneheaded instructor (certainly no one *we* know) has to change the grade on a certain student's exam. (No other exam scores are changed.) As a result of this change, the class median on the exam *increases*.

Put a "P" next to any of the following situations that are possible (*could* have happened), and an "I" next to those that are impossible (*could not* have) (you may want to make up a simple example or two to help you answer):

_____ The student's original score (before the change) was lower than the original median.

_____ The student's original and new scores were *both* higher than the original median.

_____ The student's new score was lower than the *new* median.

_____ The distribution of exam scores was bimodal before the change but had only one mode after.

_____ The mean on the exam did not change.

6. (a) Your Math 1120 instructor rolls a fair, ten-sided die 1000 times, and each time records the number (from 1 through 10) that comes up. About what will the mean \bar{x} of this data set probably be?

(b) Your Math 1120 instructor flips 11 fair coins and records the number of heads that comes up; and repeats this experiment 1000 times. About what will the mean \bar{x} of this data set probably be?

(c) How will the standard deviations of the data sets in the above two experiments compare? Explain.

7. Suppose Your Math 1120 instructor rolls the die in problem 7(a), above, 5000 instead of 1000 times. Is the mean likely to change much? What about the standard deviation? Explain.

8. Draw a line graph for the following data, which gives the boiling point of water in degrees Fahrenheit, versus atmospheric pressure in inches of mercury. (Plot atmospheric pressure on the horizontal axis.) What is the graph telling you?

Boiling Point	194.5	198.4	200.9	201.3	209.5	211.9
Pressure	20.79	22.67	23.89	24.01	28.49	29.88

9. Draw a scatterplot of the following data, which gives bloodstream CD4+ T-lymphocyte counts of cancer patients six months after chemotherapy, versus age of these patients. (Plot age on the horizontal axis.) Also draw a trend line. Is the correlation positive or negative? Explain. About what bloodstream CD4+ T-lymphocyte count would you expect in a 20 year old patient six months after chemotherapy? About how old would you expect a patient with a bloodstream CD4+ T-lymphocyte count of 400, six months after chemotherapy, to be?

Age	1	3	7	11	13	13	14	19	23	24	24
CDT4+ Count	822	590	733	385	314	628	329	342	54	131	47

10. The mean score on a set of 50 tests is 80. If three students take make-up exams, and get scores of 73, 68, 92, what is the new mean score?

11. One more student, who just got back from skiing, takes a make-up of the exam in the previous problem. What score must she get in order that the mean be 80 again?

12. Suppose the median score on the exam in the previous two problems was, originally (for the first 50 students), equal to 77. Can you say what the new median is (after all 54 students have taken the exam, and assuming the last student got the score indicated in the previous problem)? Explain.

13. Write down a bimodal data set, with six elements, such that the median, mean, and the two modes are all unequal to each other. Also write down a bimodal data set, with six elements, such that the median equals one mode and the mean equals another.

14. (a) What is the measure of the angle between the hour and minute hands at 1:45?
 (b) At 3 o'clock, the hour and minute hands will be at right angles. What is the next time *after* that when they will be at right angles again? What is the next time after that?

15. Add or subtract:

- (a) $234^{\circ}29'17'' + 22^{\circ}13'32''$
- (b) $234^{\circ}29'17'' + 152^{\circ}42'55''$
- (c) $234^{\circ}29'17'' - 22^{\circ}13'32''$
- (d) $234^{\circ}29'17'' - 152^{\circ}42'55''$

16. Suppose a circular pizza is cut into twelve slices, all of the same size and shape, in the standard way (by cutting along diameters).

- (a) How many acute angles are formed at the center of the pizza? What are the measures of these angles?
- (b) How many obtuse angles are formed at the center of the pizza? What are the measures of these angles?
- (c) How many right angles are formed at the center of the pizza?
- (d) How many straight angles are formed at the center of the pizza?

17. Draw:

- (a) Three lines in the plane, such that each line intersects both of the others;
- (b) Four lines in the plane, such that each line intersects exactly two of the others;
- (c) Six lines in the plane, such that each line intersects exactly four of the others;
- (d) Points A, B, C, D, E, F in the plane such that A, B, C are collinear; C, D, E are collinear; and E, F, A are collinear; but A, C, F are *not* collinear.