

HOMEWORK 1

- This homework is due on Thursday, October 5th 2000. We will discuss the problems in Thursday's section.
- You will need a calculator to solve the exercises.
- Give your answers to two decimal places.

Good luck!

1. The following data shows the age distribution of the members of an unidentified non-profit organization.

Age (in years)	Frequency
16-20	13
21-25	88
26-30	96
31-35	118
36-40	103
41-45	78
46-50	92
51-55	74
56-60	23
61-65	22

- (a) Display the data on a histogram. On the same plot, draw a regular frequency polygon. On a separate graph, draw the cumulative frequency polygon. What kind of non-profit organization might this be? Make some guesses as to what it might be and might not be.
- (b) What is the percentile rank in age for a person in this organization who is 33 years old. Explain in words what this means.
- (c) In which group does the median age fall? Estimate the median age of this particular population.

2. (a) Find the mean, the median, the mode, the range, the variance and the standard deviation of the following set of test scores:

3.0, 4.5, 5.0, 5.0, 5.5, 6.0, 6.0, 6.0, 6.5, 6.5, 7.0, 7.5, 7.5, 8.0

(b) The teacher decided that the test was very difficult and decided to give an extra point to each student. Without carrying out any further calculations, what will be the value of the five measures after the adjustment? Explain your reasoning.

3. Look at the next two stem-and-leaf diagrams. The one on the left shows the duration (in minutes) of telephone calls made from a residence during a one-week period. The one on the right displays the height (in meters) of the students in a middle school grade.

0	1 3 3 4 4 4 5 7 7 7 8
1	0 0 2 2 2 2 5 5 6 8 8 8 9
2	0 3 3 7 9
3	3 5
4	
5	2 9
6	4
7	3

1.4	9
1.5	1 2 4
1.5	5 6 6 8 8 9
1.6	0 1 1 1 3 3 4
1.6	6 6 8 9 9
1.7	0 2 3 3
1.7	8 9

(a) Describe the shape of each distribution. What does it tell you about human nature?

(b) Calculate the mode, the median and the mean for each distribution. Comment briefly on the usefulness of the mean in each case.

(a) Why is the sum of deviation scores, i.e. $\sum (X_i - \bar{X})$ not useful when calculating the standard deviation?

(b) Could we use the sum of squared deviations from the mean, i.e. $\sum (X_i - \bar{X})^2$ as an estimate of the variability by itself, omitting the division by N or (N-1)? Explain.

(c) Complete:

_____ is to a sample, as μ is to a population.

s^2 is to a sample, as _____ is to a population.

The measures that are calculated from a sample, for example _____ and _____ are called _____. While the measures that summarize characteristics of the population, for example _____ and _____ are called _____.

Can you explain to your mother why the concepts underlying this problem are so important and will save society?

5. (a) Calculate the range, the standard deviation and the variance of the following set of scores (*Hint*: You can first subtract 100 from all scores to simplify calculations. This will not affect the value of any measure of variability. It would affect though measures of location, such as the mean):

125	116	114	111	122	115
113	106	118	114	112	102

(b) Display the data on a stem-and-leaf diagram.