

Exam 4 – Statistics

Math 102–Spring 2008

Name Key

- (9) 1. Which measure of central tendency (average)—mean, median, mode, or midrange—would be most appropriate for each scenario.

midrange (a) The average temperature for a day.

median (b) The average family income in the state of Minnesota.

mode (c) The average employee when an evaluator rates the employees as good, fair, or poor.

- (6) 2. In order to determine how American college students feel about a proposed national law that would tax moneys received from grants and scholarships, a survey was conducted. Four hundred undergraduate students at Minnesota State University Moorhead were interviewed. Each of the four interviewers hired to conduct the survey was told to interview 25 freshman, 25 sophomores, 25 juniors and 25 seniors. Of the 400 students interviewed, 10% were in favor of the tax, 85% were opposed and 5% had no opinion.

(a) Is this survey subject to any bias (selection bias, nonresponse bias, etc.)? Explain.

See Lab

(b) Based on this survey, estimate the number of Concordia's 2000 undergraduates that oppose this proposed tax. How accurate do you think this estimate is? Explain.

- (10) 3. The following data set gives the daily high temperature in Fargo, ND during the first 15 days of April, 2008 (source the National Weather Service):

{41, 51, 56, 60, 45, 34, 47, 50, 51, 48, 37, 48, 50, 55, 68}.

(a) Find minimum value, Q1, median, Q3, and the maximum value.

34, 37, 41, 45, 47, 48, 48, (50), 50, 51, 51, 55, 56, 60, 68

minimum = 34, Q1 = 46, Median = 50, Q3 = 53, Maximum = 68

(b) Construct a stem-and-leaf plot for this data set.

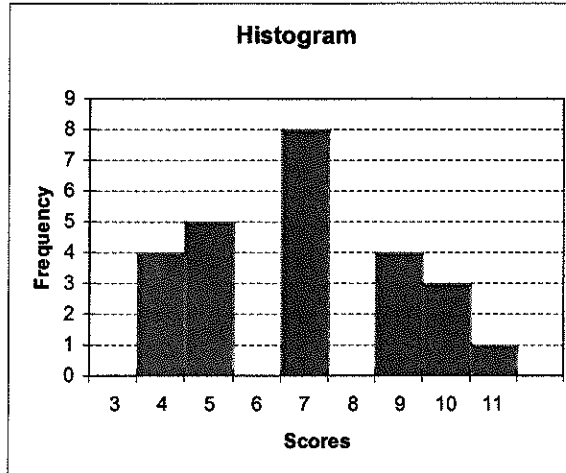
stem	leaves
3	4 7
4	1 5 7 8 8
5	1 6 0 1 0 5
6	0 8

- (5) 4. The current mean salary for the seven employees at Math, Inc. is \$37,000. If a new employee is hired at a salary of \$21,000, what would be the mean salary of the employees at Math, Inc.?

$$\frac{7(37000) + 21000}{8} = 35000$$

The new mean salary is \$35,000.

- (30) 5. Use the following graph to answer the given problems. (Show how you find each solution.)



- (a) Make a frequency table.

score	frequency
4	4
5	5
6	0
7	8
8	0
9	4
10	3
11	1

- (b) Find the mean.

$$\frac{16 + 25 + 0 + 56 + 0 + 36 + 30 + 11}{25} = \frac{174}{25} = 6 \frac{24}{25} = 6.96$$

- (c) Find the median.

7 The 13th score.

- (d) Find the midrange.

$$\frac{4 + 11}{2} = \frac{15}{2} = 7.5$$

- (e) Find the mode.

7 Most repeated.

- (f) Find range.

$$11 - 4 = 7$$

- (5) 6. Find the standard deviation for the data set {3, 4, 6, 7, 10}.

x	$x - \bar{x}$	$(x - \bar{x})^2$
3	-3	9
4	-2	4
6	0	0
7	1	1
10	4	16
30		30

$$\bar{x} = \frac{30}{5} = 6 \quad s = \sqrt{\frac{30}{4}} = \sqrt{7.5}$$

- (15) 7. One thousand test scores are approximately normally distributed with a mean of 60 and a standard deviation of 8.

- (a) What percentage of the scores are between 60 and 70?

$$z = \frac{60-60}{8} = 0$$

$$0.8944$$

$$-0.5000$$

$$z = \frac{70-60}{8} = \frac{10}{8} = 1.25$$

$$0.3944$$

$$39.44\%$$

- (b) What percentage of the scores are below 52?

$$z = \frac{52-60}{8} = -1$$

$$0.1587$$

$$15.87\%$$

- (c) What percentage of the scores are between 42 and 64?

$$z = \frac{42-60}{8} = \frac{-18}{8} = -2.25$$

$$0.6915$$

$$-0.0122$$

$$z = \frac{64-60}{8} = 0.5$$

$$0.6793$$

$$67.93\%$$

(15) 8. Find the percentage of the data that lie in the following regions for a standard normal distribution.

(a) between $z = -1.27$ and $z = 0.43$ (b) greater than 2.13

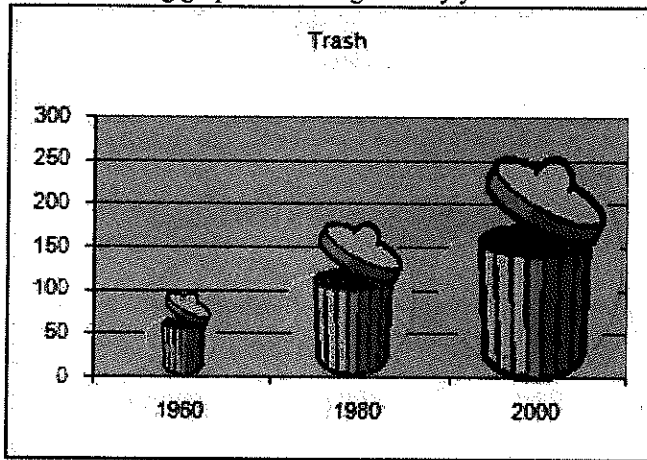
$$\begin{array}{r} 0.6664 \\ 0.1020 \\ \hline 0.5644 \end{array}$$

56.44%

$$\begin{array}{r} 1.0000 \\ - 0.9834 \\ \hline 0.0166 \end{array}$$

1.66%

(5) 9. Is the following graph misleading? Justify your answer.



The height of the cans is a ratio of 2.5 to 1.
But the size (area) makes the ratio appear
to be much larger (greater than 4 to 1).
(6.25 to 1).