

Exam 4 — Statistics

Math 110—Spring 2014

Name Key

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

- (a) The average temperature for April 17th in Moorhead is 45°F. *Midrange*
- (b) The average family income in Minnesota was \$58,906 in the year 2013. *median*
- (c) The average daily **high** temperature in Moorhead for April is 56°F. *mean*

(6) 2. The following survey question was asked on The Willis Report on FOX Business:
 “Should the Government force young people to save for retirement?”
 Viewers are to respond to the question on the internet.

(a) Identify the sampling technique. (Stratified, Systemic, Cluster, Random, Convenience)
Cluster or Convenience

(b) Discuss any bias in this survey. *Viewers of the program probably have similar viewpoints. The word “force” encourages people to say no since the word has negative connotations. (What is “young”?)*
Selective bias since people who watch FOX are more conservative than the general population. (Also, only people who choose to respond; they tend to hold stronger opinions.)

3. The following data set gives the highest temperature for January in Moorhead from 2001–2014. (Source Weather Warehouse)

{41, 51, 43, 33, 38, 39, 37, 40, 44, 36, 34, 55, 40, 42}

(41) (a) Draw a Stem-and-Leaf plot for this data set.

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

(10) (b) Find the minimum, Q₁, median, Q₃, and maximum.

(33) 34, 36, (37) 38, 39, 40 | 40, 41, 42, (43) 44, 51, (55)

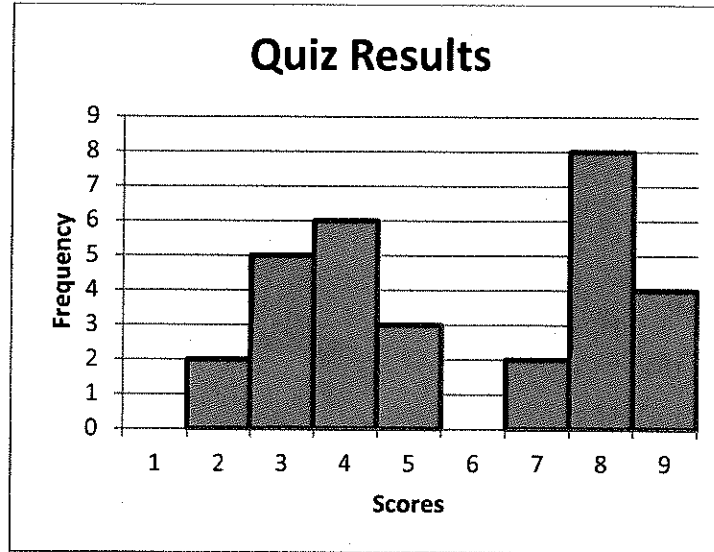
minimum = 33, Q₁ = 37, median = 40, Q₃ = 43, maximum = 55

- (5) 4. The current mean salary for the six employees at EduMath, Inc. is \$47,000. If a new employee is hired at a salary of \$26,000, what would be the new mean salary of the employees at EduMath, Inc.?

$$\frac{6(47000) + 26000}{7} = \frac{308000}{7} = 44,000$$

The new mean salary for EduMath is \$44,000.

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



$$\begin{array}{r} 5 \\ 30 \overline{) 172} \\ \underline{150} \\ 22 \end{array}$$

- (a) Make a frequency table.

Score	Frequency
2	2
3	5
4	6
5	3
6	0
7	2
8	8
9	4

- (b) Find the mean.

$$\frac{2(2) + 3(5) + 4(6) + 5(3) + 7(2) + 8(8) + 9(4)}{30} = \frac{4 + 15 + 24 + 15 + 14 + 64 + 36}{30} = \frac{172}{30} = 5 \frac{11}{15}$$

- (c) Find the median.

5 middle score between 5th + 16th.

- (d) Find the mode.

8 most frequent

- (e) Find the midrange

$$\frac{2 + 9}{2} = \frac{11}{2} = 5.5$$

- (f) Find the range.

$$9 - 2 = 7$$

- (5) 6. Find the standard deviation for the data set {4, 7, 8, 11, 15}.

x	$x - \bar{x}$	$(x - \bar{x})^2$
4	-5	25
7	-2	4
8	-1	1
11	2	4
15	6	36
45		70

$$\bar{x} = \frac{45}{5} = 9 \quad s = \sqrt{\frac{70}{4}} = \sqrt{17.5}$$

- (10) 7. Find the percentage of the data that lie in the following regions for a standard normal distribution.

- (a) between $z = -0.79$ and 1.38

$$\begin{array}{r} 0.9162 \\ - 0.2148 \\ \hline 0.7014 \end{array}$$

70.14%

- (b) greater than -1.24

$$\begin{array}{r} 1.0000 \\ - 0.1075 \\ \hline 0.8925 \end{array}$$

89.25%

- (15) 8. Seven thousand exam scores are approximately normally distributed with a mean of 58 and a standard deviation of 5.

- (a) What percent of the scores are between 62 and 68?

$$z = \frac{62-58}{5} = \frac{4}{5} = 0.8 \quad z = \frac{68-58}{5} = 2$$

$$\begin{array}{r} 0.9772 \\ - 0.7881 \\ \hline 0.1891 \end{array}$$

18.91%

- (b) What percent of the scores are less than 56?

$$z = \frac{56-58}{5} = \frac{-2}{5} = -0.4$$

$$0.3446$$

34.46%

- (c) Approximately, how many of the seven thousand scores are between 53 and 63?

$$z = \frac{53-58}{5} = -1$$

$$z = \frac{63-58}{5} = 1$$

68%

$$0.68$$

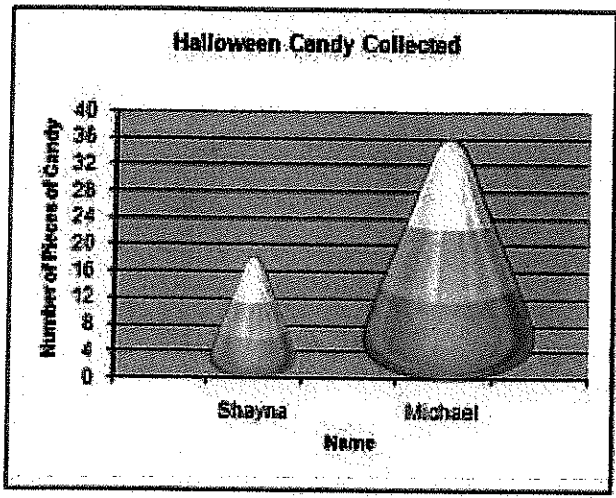
$$\begin{array}{r} 7000 \\ \hline 4760.00 \end{array}$$

Approximately, 4760 scores were between 53 and 63.

(4778 with 68.26%)

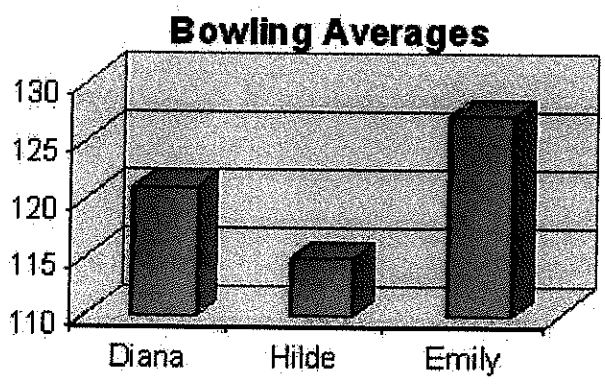
(6) 9. What is misleading in each of the following graphs? Explain your answer.

(a)



Area makes it appear 4 to 1.
Actual ratio is 2 to 1.

(b)



Not starting at 200 makes Emily's score appear 3 times Hilde's score.