Understanding the Concepts and Skills

3.1 Explain in detail the purpose of a measure of center.

The purpose of measure of center is to indicate where the center or most typical value of of where a dataset lies.

3.3 Of the mean, median, and mode, which is the only one appropriate for use with qualitative data?

THE MODE

3.5 Consider the data set 1, 2, 3, 4, 5, 6, 7, 8, 99.
a. Obtain the mean and median of the data.
b. Replace the 9 in the data set by 99 and again compute the mean and median. Decide which measure of center works better here and explain your answer.
c. For the data set in part (b), the mean is neither central nor typical for the data. The lack of what property of the mean accounts for this result?

(a) mean $(\bar{x}) = 5$ median $= 5$

(B) mean $= 15$ median $= 5$

THE MEDIAN IS A BETTER MEASURE OF CENTER BECAUSE IT IS NOT INFLUENCED BY THE ONE UNUSUALLY LARGE VALUE, 99.

(C) A RESISTANT MEASURE IS NOT SENSITIVE TO THE INFLUENCE OF A FEW EXTREME OBSERVATIONS. THE MEDIAN IS A RESISTANT MEASURE OF CENTER, BUT THE MEAN IS NOT.

3.7 Floor Space. The U.S. Department of Housing and Urban Development and the U.S. Census Bureau compile information on new, privately owned single-family houses. According to the document *Characteristics of New Housing*, in 2003 the mean floor space of such homes was 2330 sq ft and the median was 2137 sq ft. Which measure of center do you think is more appropriate? Justify your answer.

MEDIAN IS MORE APPROPRIATE, BECASE IT IS NOT AFFECTED STRONGLY BY THE RELATIVELY FEW HOMES THAT HAVE EXTREMELY LARGE FLOOR SPACES.

For 3.13 find:

a. mean. *b. median.* *c. mode(s).*
For the mean and the median, round each answer to one more decimal place than that used for the observations.

→

3.13 Billionaires' Club. Each year, *Forbes* magazine compiles a list of the 400 richest Americans. For 2005, the top five on the list are as shown in the following table.

Person	Wealth ($ billions)
Bill Gates	51
Warren Buffett	40
Paul Allen	22.5
Michael Dell	18
Larry Ellison	17

148.5 / 5

MEAN = $29.70 BILLION

MEDIAN = $22.50 BILLION

NO MODE

3.17 Medieval Cremation Burials. In the article "Material Culture as Memory: Combs and Cremations in Early Medieval Britain" (*Early Medieval Europe*, Vol. 12, Issue 2, pp. 89–128), H. Williams discussed the frequency of cremation burials found in 17 archaeological sites in eastern England. Here are the data.

83	64	46	48	523	35	34	265	2484
46	385	21	86	429	51	258	119	

N = 17

a. Obtain the mean, median, and mode of these data.
b. Which measure of center do you think works best here? Explain your answer.

Stem-and-leaf plot:
```
2  | 1
3  | 4 5
4  | 6 6 8
5  | 1
6  | 4
8  | 3 6
11 | 9
25 | 8
26 | 5
38 | 5
42 | 9
52 | 3
248| 4
```

(a) mode – 46 burials
Median – 83 burials
Mean – 292.8 burials

(b) The median, because of its resistance to the extremely large observations.

3.20 Explain what each symbol represents.
a. Σ b. n c. $\bar{x}$

Σ — Summation
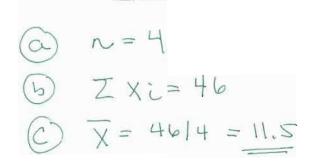
n — Sample size

$\bar{x}$ — Sample mean

3.21 For a particular population, is the population mean a variable? What about a sample mean?

No, the population mean is a constant.
The sample mean is a variable because it varies from sample to sample.

3.23 Consider these sample data: $x_1 = 12$, $x_2 = 8$, $x_3 = 9$, $x_4 = 17$.
a. Find n.   b. Compute Σx_i.   c. Determine $\bar{x}$.

(a) $n = 4$

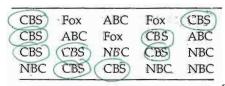(b) $\Sigma x_i = 46$

(c) $\bar{x} = 46/4 = 11.5$

3.27 Hazardous Wastes. The Environmental Protection Agency (EPA) collects information on generation, management, and final disposal of hazardous wastes. In a study issued by the EPA, titled *National Biennial RCRA Hazardous Waste Report*, data is filed with states by waste generating, treatment, storage, and disposal facilities. A sample of hazardous waste shipping companies in Tennessee yielded the following amounts, in tons, of waste shipped during 2001.

3202	226	207	203	3718	362	772
1252	2093	3388	358	187	281	209

a. Find n.
b. Compute Σx_i.
c. Determine the sample mean. *Round your answer to one more decimal place than that used for the observations.*

(a) $N = 14$

(b) $\Sigma x_i = 16,458$ tons

(c) $\bar{x} = \dfrac{16458}{14} = 1,175.6 \text{ TONS}$

a. Determine the mode of the data.
b. Decide whether it would be appropriate to use either the mean or the median as a measure of center. Explain your answer.

3.28 Top Broadcast Shows. The networks for the top 20 television shows, as determined by the *Nielsen Ratings* for the week of April 18–24, 2005, are shown in the following table.

CBS	Fox	ABC	Fox	CBS
CBS	ABC	Fox	CBS	ABC
CBS	CBS	NBC	CBS	NBC
NBC	CBS	CBS	NBC	NBC

CBS – 9
ABC – 3
NBC – 5
Fox – 3

(a) mode is CBS.

(b) NO. Mean + median are inappropriate for categorical data.