

# Chapter 5 Measuring Central Tendency of Grouped Data

## I. Introduction

- A. When actual data is unavailable or of an unmanageable volume, it may be necessary to determine parameters and statistics using a frequency distribution.
- B. Important symbols:



Symbol	Definition	Symbol	Definition
$\bar{X}$	the sample mean	$fx$	frequency times the class midpoint
$X$	the midpoint of a class	$\sum fx$	summation of $fx$
$f$	the frequency of a class	$n$	total frequency



## II. The grouped sample mean

$$\bar{X} = \frac{\sum fx}{n}$$

- A. Linda needs to estimate this year's tape rentals for a bank loan application. She will use the page 4 tape rentals summarized with a frequency distribution to estimate average daily rentals for the year.
- B. Linda must calculate each class midpoint and then multiply it by the class frequency.

The midpoint formula is

$$X = \frac{X_1 + X_2}{2}$$

For class one

$$X = \frac{50 + 59}{2} = 54.5$$

$$\bar{X} = \frac{\sum fx}{n} = \frac{1,117.5}{15} = 74.5$$

Stated Class Limits	Frequency (f)	x	fx
50 - 59	2.0	54.5	109.0
60 - 69	3.0	64.5	193.5
70 - 79	5.0	74.5	372.5
80 - 89	3.0	84.5	253.5
90 - 99	2.0	94.5	189.0
<b>Totals</b>	<b>n = 15.0</b>		<b><math>\sum fx = 1,117.5</math></b>

Estimated yearly tape rentals would be  $(52)(7)(74.5) = 27,118$ .

## III. The grouped median

- A. The median is the middle number.

$$L + \frac{\frac{n}{2} - CF_b}{f}(i)$$

Symbols	Definitions
L	lower real limit of the median's class
$CF_b$	cumulative frequency before the median's frequency
i	class interval (width)

- B. Use  $\frac{n}{2}$  to determine the location of the middle frequency.

$$\frac{n}{2} = \frac{15}{2} = 7.5$$

- C. Beginning at the top of the frequency distribution and counting down the frequency column reveals that the 7.5 frequency is located in the third class from the top (or bottom for that matter). The lower real limit of the median's class is 69.5 and the class is 10 wide.

Class Limits	Frequency
50 - 59	2
60 - 69	3
70 - 79	5
80 - 89	3
90 - 99	2
	15

lower limit → 60 - 69

→ 70 - 79

→ 80 - 89

→ 90 - 99

→ 15

Used 2 here

Used 3 here

Need 2.5 from here to get to 7.5

Out of 5

$$L + \frac{\frac{n}{2} - CF_b}{f}(i)$$

$$= 69.5 + \frac{7.5 - 5}{5}(10)$$

$$= 69.5 + 5 = 74.5$$