Chapter 6 Measuring Dispersion of Grouped Data

I. Introduction

A. Daily tape rentals summarized in chapter 2 will be analyzed.

B.

Daily Rentals Beginning 1/2/98					
Stated Class Limits	Frequency (f)	x	fx	x^2	fx^2
50 - 59	2.00	54.50	109.00	2,970.25	5,940.50
60 - 69	3.00	64.50	193.50	4,160.25	12,480.75
70 - 79	5.00	74.50	372.50	5,550.25	27,751.25
80 - 89	3.00	84.50	253.50	7,140.25	21,420.75
90 - 99	2.00	94.50	189.00	8,930.25	17,860.50
Totals	n = 15.00		1,117.50		85,453.75

II. Range

A. Range = H - L

B. Use the real class limits for H and L

$$H - L = 99.5 - 49.5 = 50$$

III. Sample standard deviation

A. Ungrouped data

$$S = \sqrt{\frac{\sum x^2 - \frac{\left(\sum x\right)^2}{n}}{n-1}}$$

B. Grouped data

$$S = \sqrt{\frac{\sum fx^2 - \frac{\left(\sum fx\right)^2}{n}}{n-1}}$$

$$= \sqrt{\frac{85{,}453.75 - \frac{(1{,}117.5)^2}{15}}{15-1}} = \sqrt{\frac{85{,}453.75 - 83{,}253.75}{14}}$$

$$= \sqrt{\frac{2{,}200}{14}} = \sqrt{157.143} = 12.5$$

IV. Variance

$$S^2 = (S)^2 = (12.5)^2 = 156.25 \approx 156.3$$

V. Measures of position

A. Measures of position locate interesting points along data arranged into an array.

B. **Quartiles** separate data into quarters.

1. Q_1 separates the first and second quarters.
2. Q_2, the median, separates the second and third quarters.
3. Q_3 separates the third and fourth quarters.

$$Q_1 = L + \frac{\frac{n}{4} - CF_b}{f}(i)$$

$$Q_2 = L + \frac{\frac{n}{2} - CF_b}{f}(i)$$

$$Q_3 = L + \frac{\frac{3n}{4} - CF_b}{f}(i)$$

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