July 3 (1)

Math 146
Summer 2013
Measures of Center and **Measures of Variation** Chap 3

SYMMETRIC DISTRIBUTIONS 	**SKEWED DISTRIBUTIONS** 
Measure of Center = **Mean**	Measure of Center = **Median**
Min, max and range = max - min	Min, max and range = max - min
Measure of variation = **Standard Deviation**	Measure of variation = **IQR**

Example:
A large bakery ordered cartons of blueberries for their muffins. The average weight of a carton is supposed to be 22 ounces. Random samples of cartons from two suppliers were weighed. The weights in ounces of the cartons were:

small standard deviation → which supplier

Supplier 1:	17	22	22	22	27
Supplier 2:	17	19	20	27	27

← large standard deviation has the most variation

Compute the mean for each supplier $\bar{x}_1 \approx 22$ $\bar{x}_2 \approx 22$

Compute the min, max, and range for each supplier S_1 Min = 17 Max 27 range = 10

Compute the standard deviation for each supplier: S_2 Min = 17 Max = 27 range = 10

Definition: The **standard deviation** is the "standard" way to measure the spread of data around the mean. **It is a measure of variation.**

Formula for computing the standard deviation: $S = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$ $\bar{x}$ = x bar

S_1

	$x - \bar{x}$	$(x-\bar{x})^2$
17 − 22	-5	25
22 − 22	0	0
22 − 22	0	0
22 − 22	0	0
27 − 22	5	25
	$\Sigma(x-\bar{x})^2$ →	50

$\frac{50}{4} = \sqrt{12.5} \approx 3.5 = s$

S_1 $\bar{x} = 22.02$

$s = 3.502$

Chebyshev's Theorem states that: For any data set, at least 75% of the data must lie within 2 standard deviations of the mean

x	$\bar{x}$	$x-\bar{x}$	$(x-\bar{x})^2$
17	22	-5	25
19	22	-3	9
20	22	-2	4
27	22	+5	25
27	22	+5	25

$\sum (x-\bar{x})^2 = 88$

$\frac{88}{4} = 22$

$\sqrt{22} \approx 4.7$

$$\sqrt{\frac{\sum (x-\bar{x})^2}{n-1}}$$

$\frac{75}{13}$

$\frac{}{88}$

S_2 $\bar{x} = 22$ oz

$s = 4.7$ oz