in class
pg. 98 1 4, 6, 8, 9, 11 ?

3.2 Measures of Variation

Range - difference between the largest and smallest values of the data set

Standard deviation (σ_x ; S_x) measure how the data values differ from the mean.
- low standard deviation indicates the data values are close to the mean
- high standard deviation means the data points are spread out over a large range

sample standard deviation $S_x = \sqrt{\dfrac{\Sigma(x-\bar{x})^2}{n-1}}$

variance $s^2 = \dfrac{\Sigma(x-\bar{x})^2}{n-1}$

What does it mean if two data sets have the same mean but differing standard deviations?
When might this be important? (reliability of consistency)

population mean $\mu = \dfrac{\Sigma x}{N}$

* pg. 93 explains N vs n-1

population standard deviation $\sigma = \sqrt{\dfrac{\Sigma(x-\mu)^2}{N}}$

Coefficient of variation (CV) - expresses the standard deviation as a percentage of the mean

$$CV = \frac{s}{\bar{x}} \quad \text{or} \quad CV = \frac{\sigma}{\mu}$$

Sample | population

not dependent on a unit of measure, so ∴ CV's of different populations may be compared

only meaningful with ratios and means not equal to zero

Example 1 # 1

A) Range: $58 - 4 = 54$ Variance $= 225$

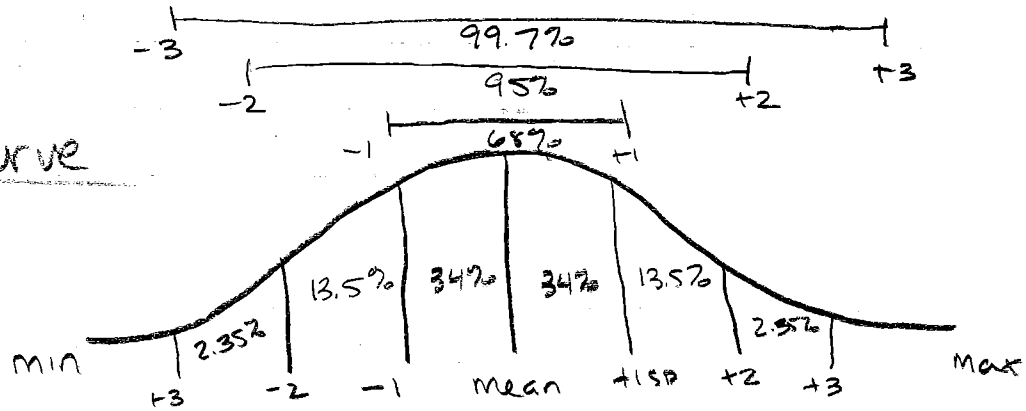
Mean: $\frac{251}{12} = 20.917$ Standard dev $= S_x = 15$

B) Coefficient variation $= \frac{15}{20.917} = .717$

$= \boxed{71.712\%}$

Large CV signifies a large variation in the distribution

Normal Curve



3.2 cont'd

Chebyshev's Theorem

μ = population mean
σ = population SD

75% range $\mu \pm 2\sigma$
88.9% range $\mu \pm 3\sigma$
93.8% range $\mu \pm 4\sigma$

Example 2 (5)

A) Pax World $CV = \frac{11.56}{11.69} = 98.888\%$

Vanguard $CV = \frac{12.5}{5.61} = 222.816\%$

Pax appears to be less risky

B) Pax $11.69 + 2(11.56) = 34.81$
$11.69 - 2(11.56) = -11.43$

Vanguard $5.61 + 2(12.5) = 30.61$
$5.61 - 2(12.5) = -19.39$

Range for Pax appears to be a better fund

Calculator Standard Deviation (wki)

L_1	L_2	L_3	variance	SD
Data	$L_1 - \bar{x}$	$(L_2)^2$		
$\bar{x}$ =	———	Σ =	$\frac{\Sigma L_3}{n-1}$	$\sqrt{\text{variance}}$

Skewed data with mean/median