Normal Distributions and the Normal Curve

PR14 and PR15   Lesson 11.9

Date

Recall some basic definitions

* Mean (called x-bar) - the arithmetic average found by adding all data values, called x_i and dividing by n, where n represents the number of data values

    * The mean also can be represented by the symbol μ (pronounced "me-you")

* Standard deviation - a measure of how much the values in a data set vary (deviate) from the mean
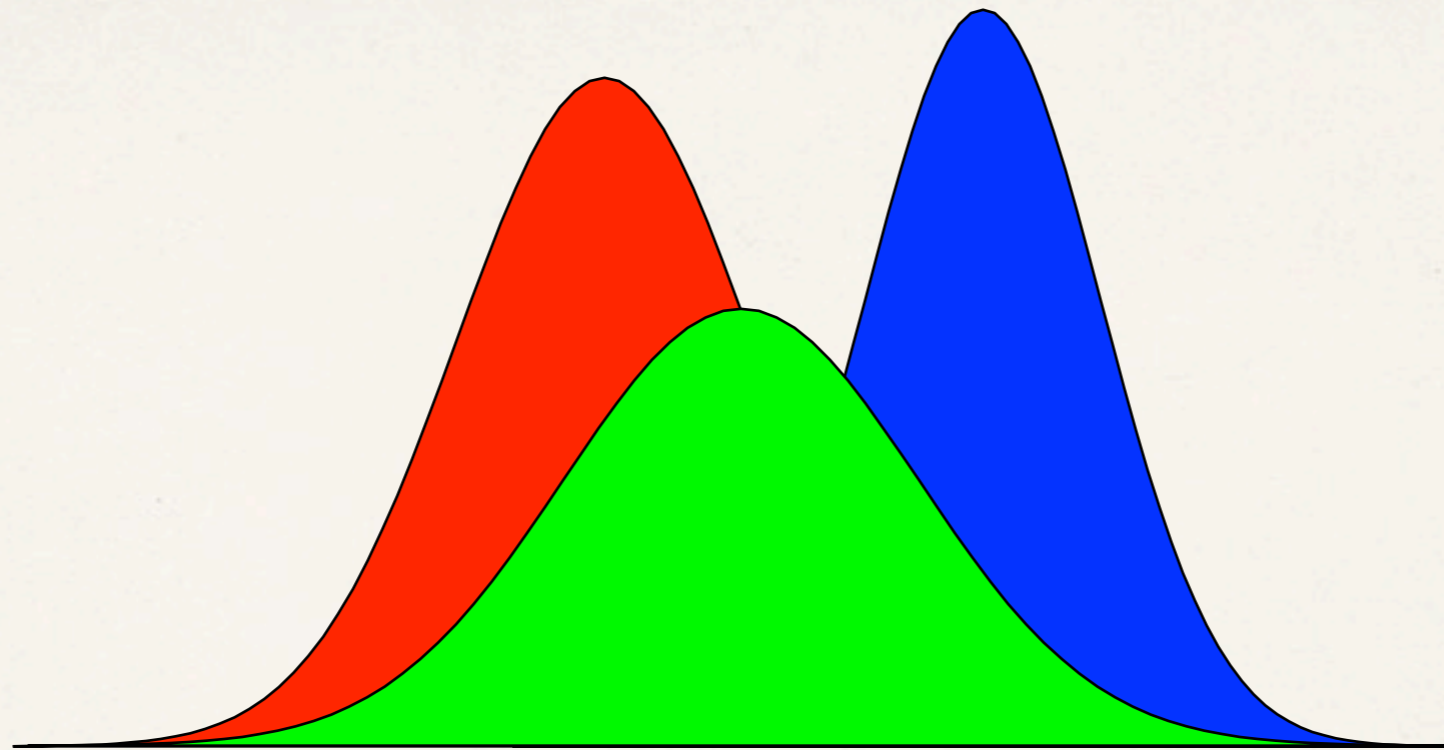
HEIGHTS OF MOTHERS

CLASS LIMITS(in.)	FREQUENCY
52-53	0.5
53-54	1.5
54-55	1
55-56	2
56-57	6.5
57-58	18
58-59	34.5
59-60	79.5
60-61	135.5
61-62	163
62-63	183
63-64	163
64-65	114.5
65-66	78.5
66-67	41
67-68	16
68-69	7.5
69-70	4.5
70-71	2
TOTAL	1052

Histogram Of Heights Of Mothers (in.)
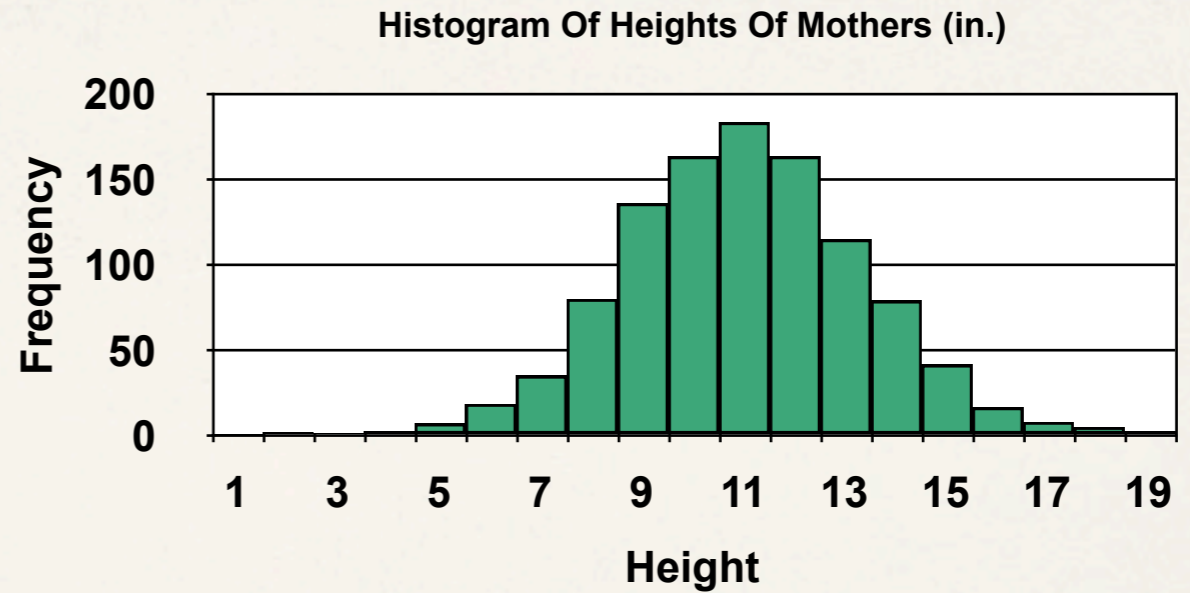
By connecting the left corners of each histogram bar, you create a "curve"

3 General Types of Curves

Positively Skewed   Normally Distributed   Negatively Skewed

Variance < Variance < Variance

Standard < Standard < Standard
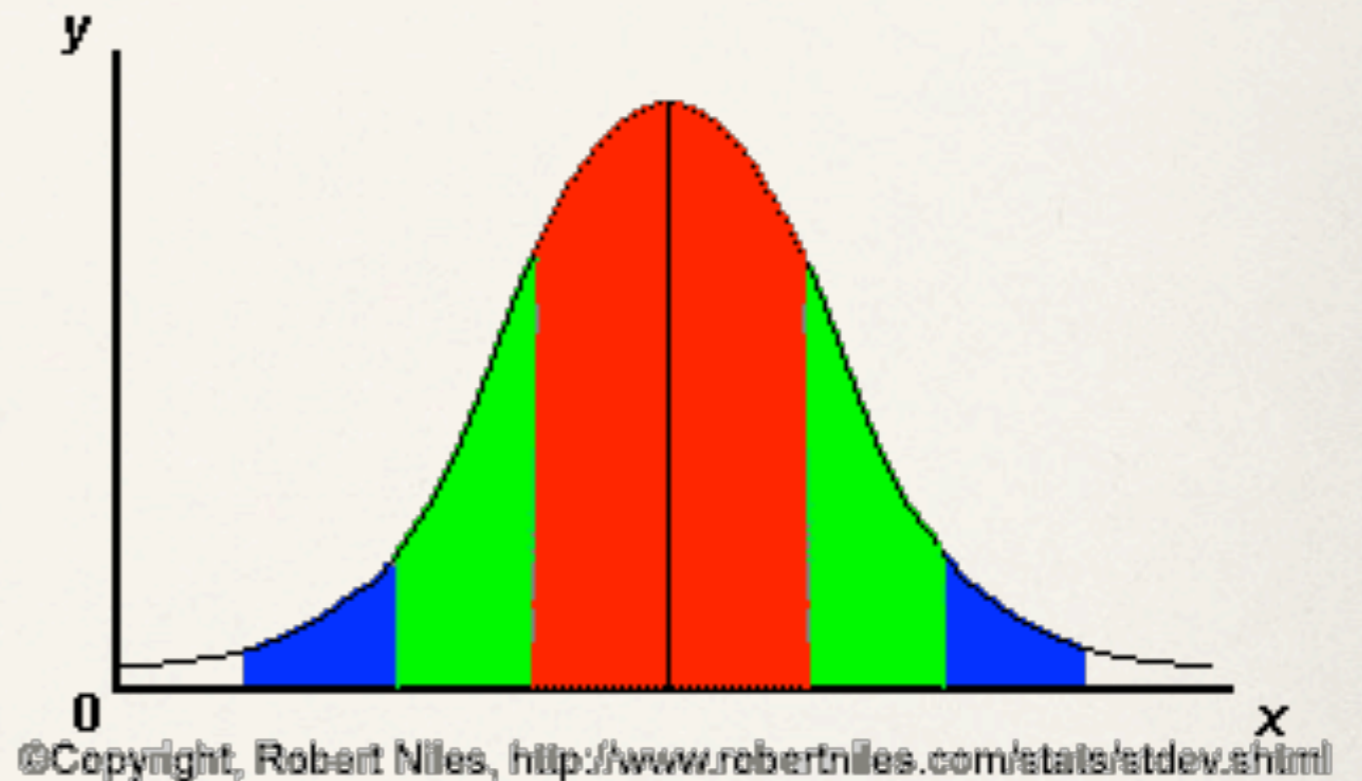Deviation Deviation Deviation

The Empirical Rule

* In any standard normal curve:

  * 68% of the data lies within one standard deviation of the mean (one left to one right)

  * 95% of the data lies within two standard deviations of the mean (two left and two right)

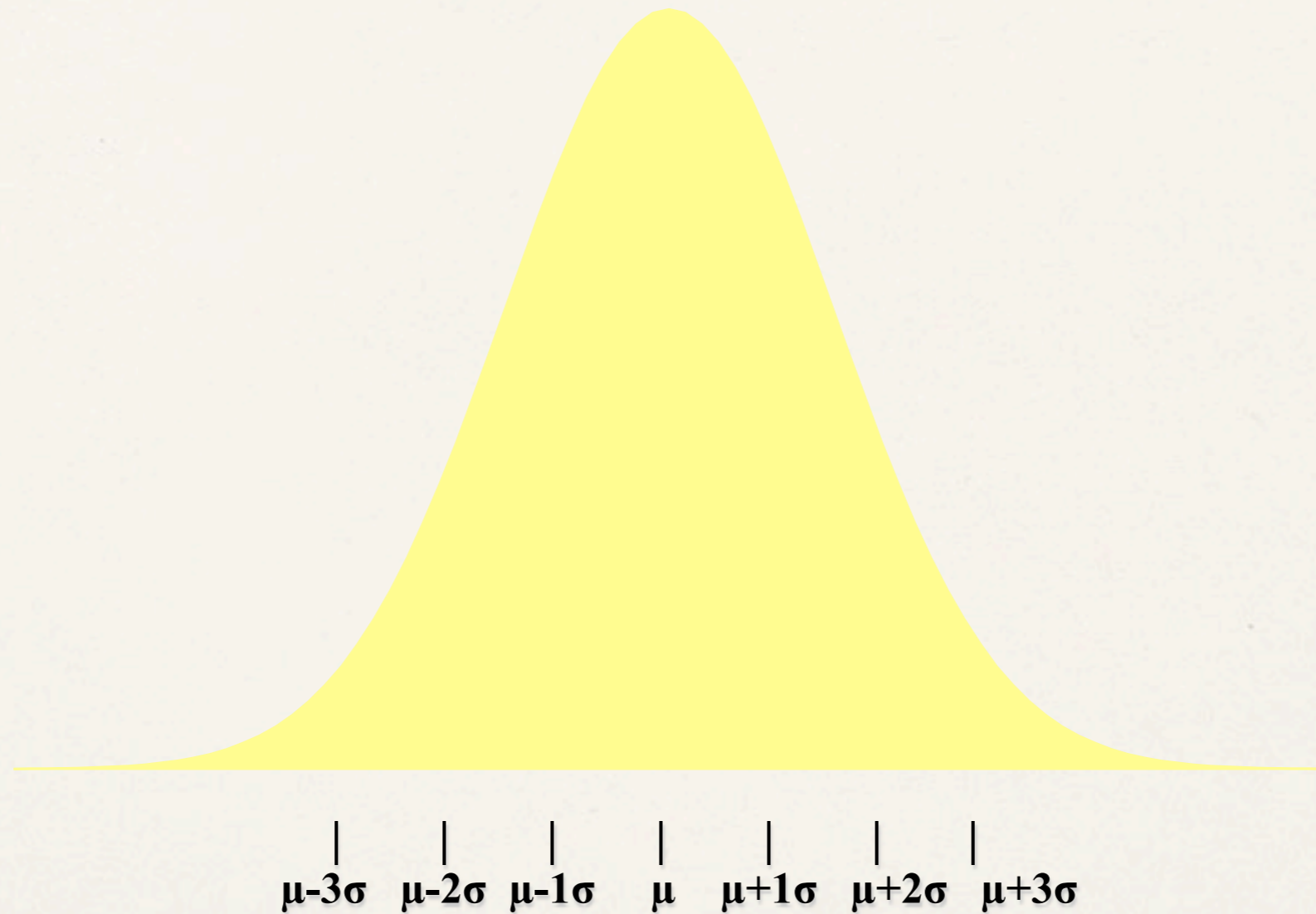 * 99% of the data lies within three standard deviations of the mean

| -3 | -2 | -1 | 0 | 1 | 2 | 3 |

«----- STANDARD DEVIATION UNITS -----»
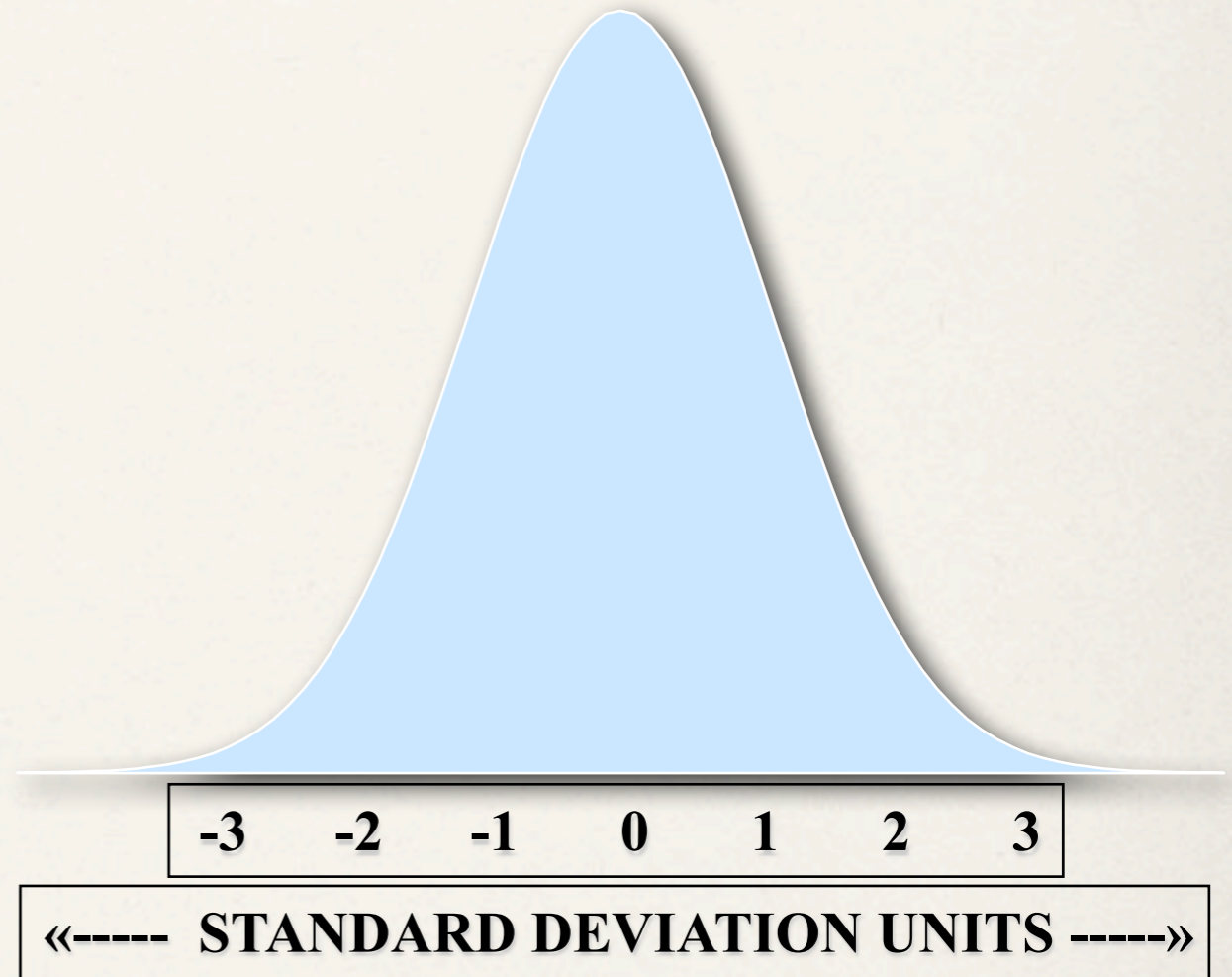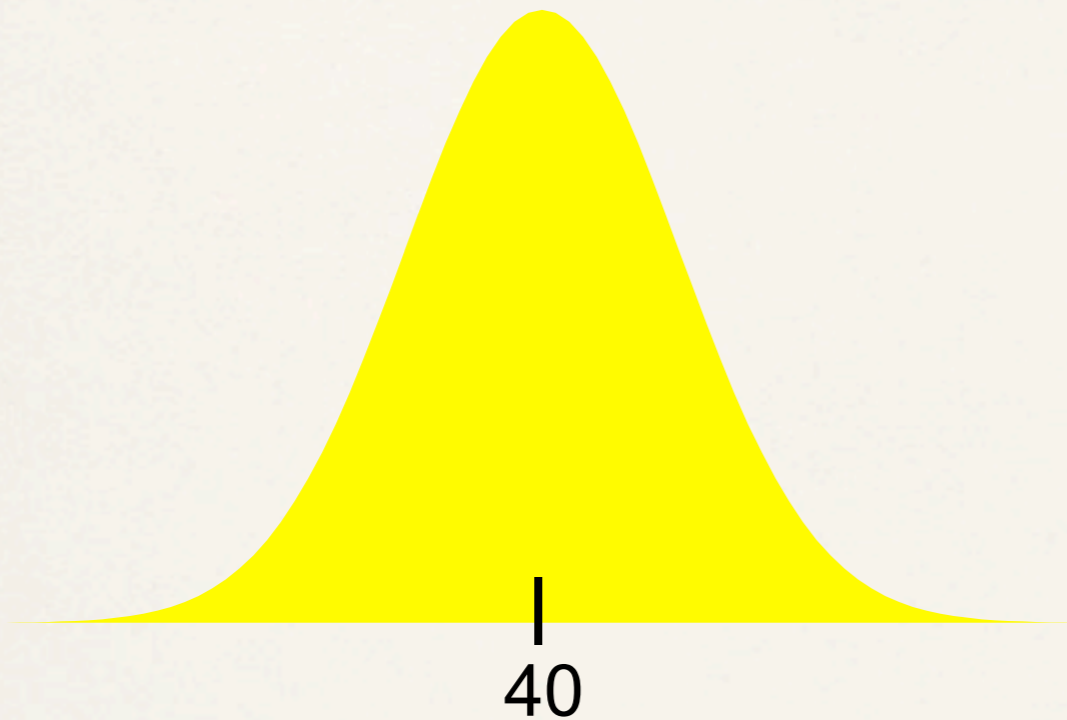
Another way to look at it

* 68% of the data fits within one standard deviation of the mean (1 σ) - the red

* 95% of the data fits within two standard deviations of the mean (2 σ) - the red and green

* 99% of the data fits within three standard deviations of the mean (3 σ) - the red, green, and blue

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Assume mean = μ and standard deviation = σ
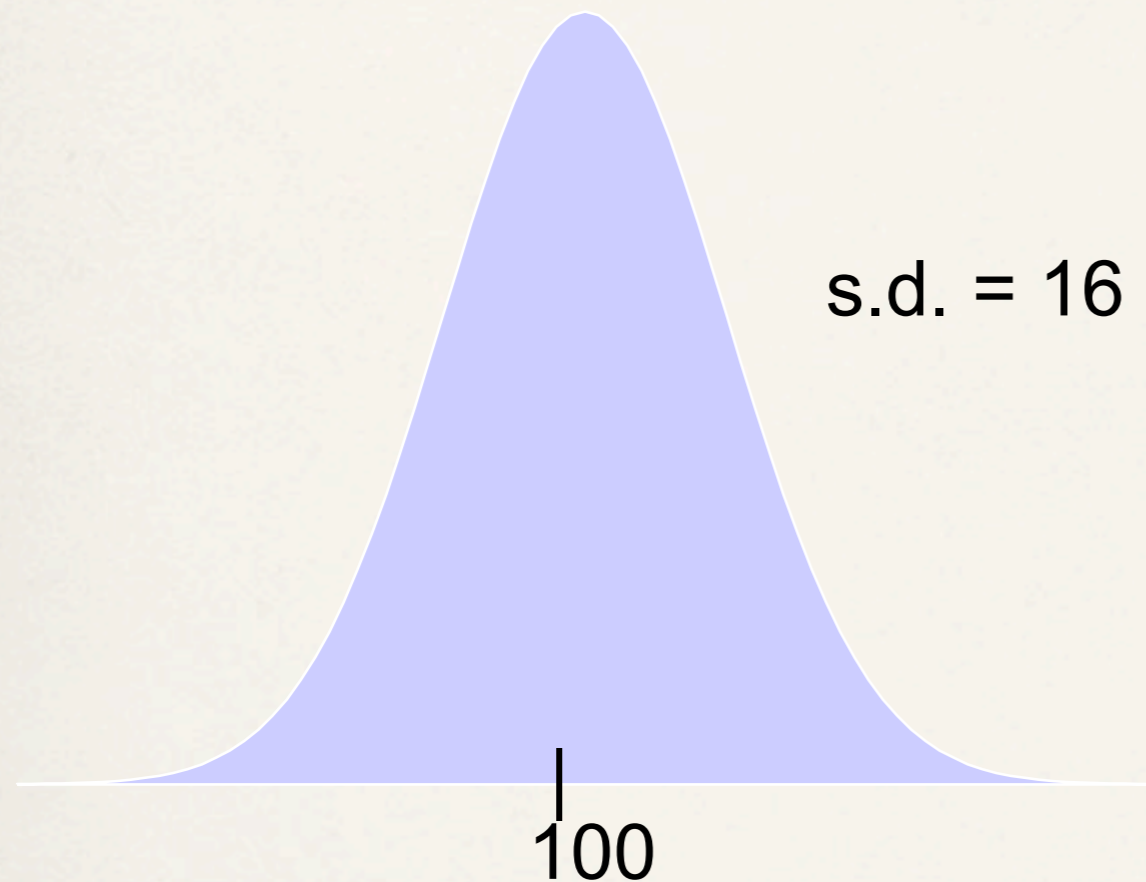

μ-3σ μ-2σ μ-1σ   μ   μ+1σ μ+2σ μ+3σ

Applying the information

40

- Assume the probability distribution has a mean of 40 and a standard deviation of 2.

- $P(36 < x < 42) = ?????$

Applying the Information

s.d. = 16

100

* IQ scores are normally distributed with a mean of 100 and a standard deviation of 16.

* What is the 99th percentile of IQ scores, approximately?

Which is better: An ACT score of 30 or an SAT score of 750?

- ACT scores are normally distributed with a mean of 21.1 and a standard deviation of 4.7.

- SAT scores are normally distributed with a mean of 500 and a standard deviation of 115.