

# Wednesday, September 12, 2018



Center  
Spread

- Warm-up

- For the prices (in cents per pound) of bananas reported from 15 markets surveyed by the U.S. Department of Agriculture

$$\bar{x} = 48.4 \text{ lb}$$

$$s_x = 3.5 \text{ lb}$$

51	48	50	48	45
52	53	49	43	42
45	52	52	46	50

$$\text{med} = 49$$

$$\text{IQR} = 7$$

- Using the calculator
- Create a dot plot
- Find the mean & standard deviation
- Find the median & IQR

Content Objective: I will use the normal distribution to standardize scores.

Social Objective: I will participate in the class activities.

Language Objective: I will use correct vocabulary such as mean, standard deviation, standard score, percentile, z-score and distribution correctly both written and spoken.

# Check In



# Let's adjust the data

add or subtract every value  $\rightarrow$  spread stays the same  
center moves  $+$   $-$

- Inflation...

- Add 3 cents to each price

- What happens to

- Distribution shape?
  - Mean?  $\rightarrow +3$
  - Standard Deviation?
  - Median?  $+3$
  - IQR?  $\rightarrow$

$\rightarrow$  look the same  
 $\rightarrow$  stay the same  
 $\rightarrow$  stay the same



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# Let's rescale

- To a different currency

- Approximate to Canadian Dollars: (x 1.3)

- What happens to

- The shape of the distribution?
  - Measures of center?
  - Measures of spread?

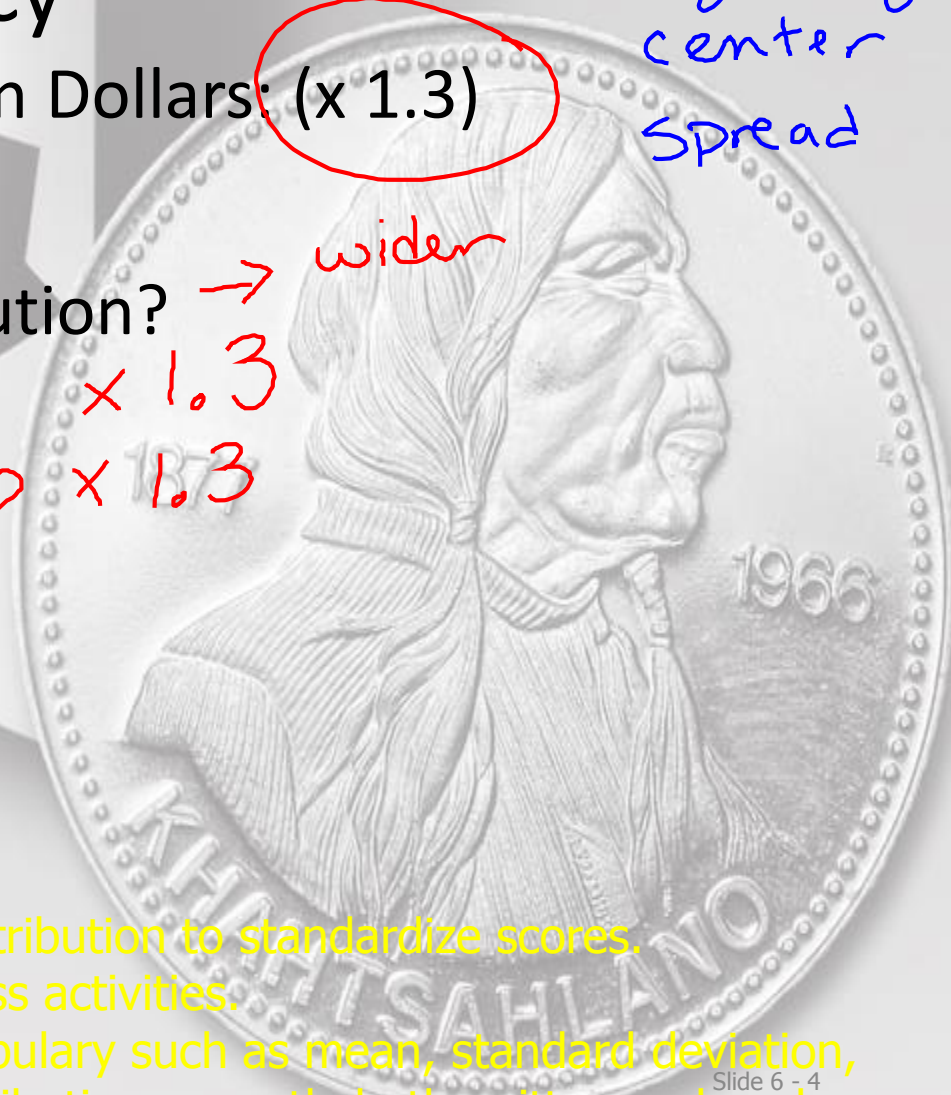
x or ÷

→ everything  
center  
spread

→ wider

→ x 1.3

→ x 1.3




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Standardizing data into z-scores **shifts** the data by subtracting the mean and **rescales** the values by dividing by their standard deviation.

- What happens to the shape?
- **Standardizing into z-scores does not change the **shape** of the distribution.**
- What happens to the center?  $\longrightarrow$   is the z-score of the mean  
 $102 - 75$
- **Standardizing into z-scores changes the **center** by making the mean 0.**
- What happens to the spread?  $\longrightarrow$  focus the standard deviation to 1
- **Standardizing into z-scores changes the **spread** by making the standard deviation 1.**

$$z = \frac{x - 70.3}{15}$$

$$102 - 75$$

is the z-score of the mean

focus the standard deviation to 1

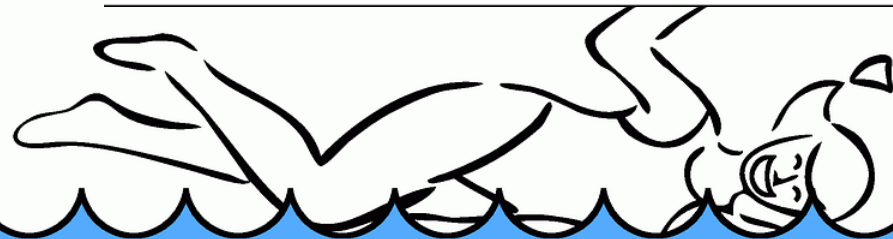
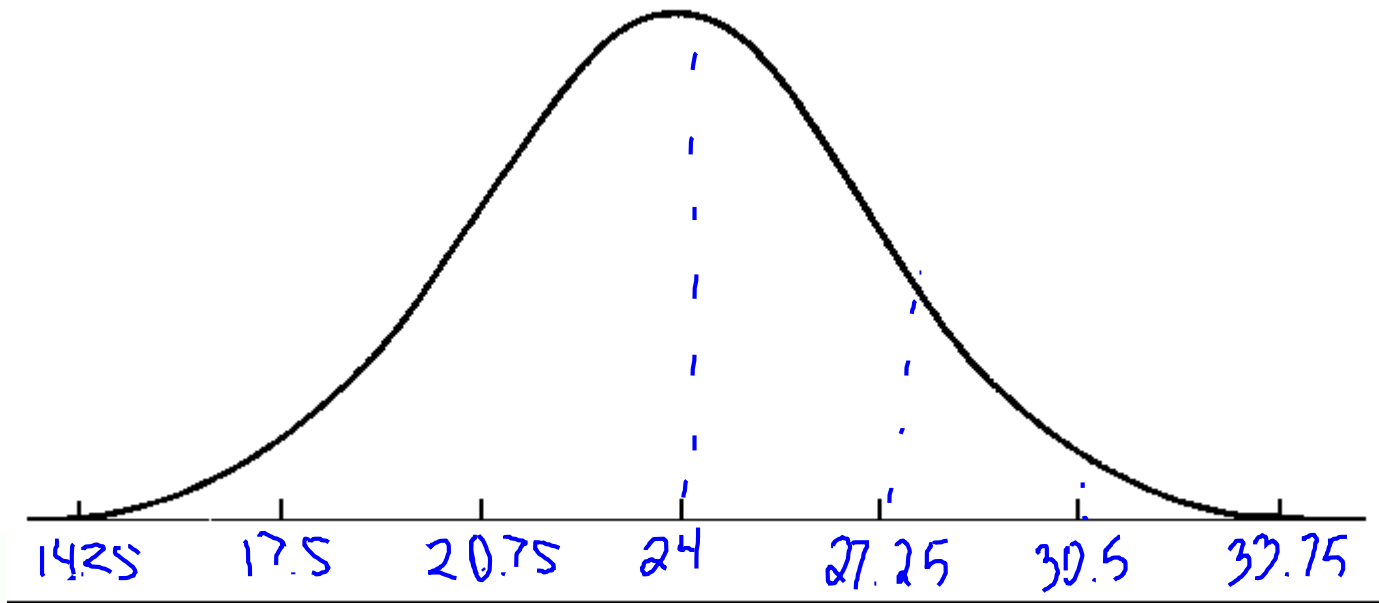
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# Swimmer Data

- The distribution for male Olympic swimmers can be described by  $N(24, 3.25)$
- Mark the mean and  $\pm 3$  standard deviations on the Normal model



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I will be prepared for the chapter 6 assessment.

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## Language:

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ESSENTIAL QUESTION: What will be on the chapter 6 test and am I prepared?

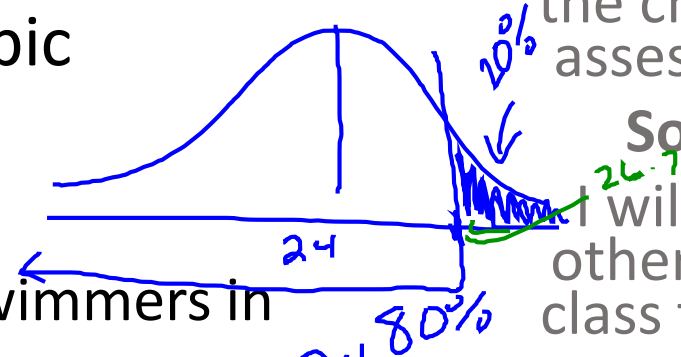
# Swimmer Data

- The distribution for male Olympic swimmers can be described by  $N(24, 3.25)$  *%iles in body*
- Find the bounds in ages of female swimmers in the following ranges

• The oldest 20%

• The youngest 15%

• The middle 40%



$$.8000 \quad Z = 0.85$$

$$3.25 \cdot 0.85 = \frac{x - 24}{3.25} \cdot 3.25$$

$$2.7 = \frac{x - 24}{+24} + 24$$

$$26.7 = x$$

**Content:**

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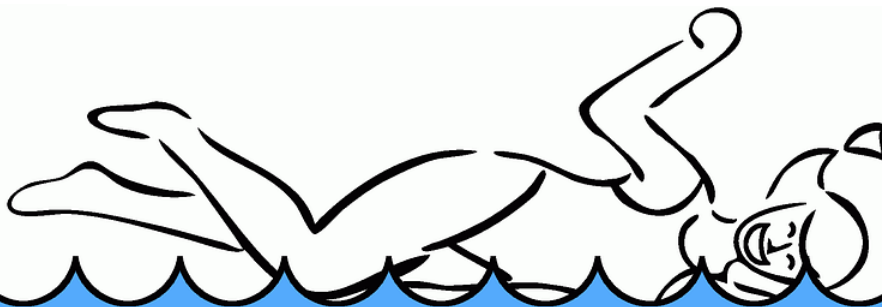
**Social:**

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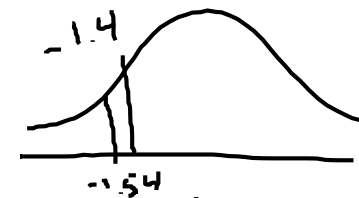
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# Swimmer Data



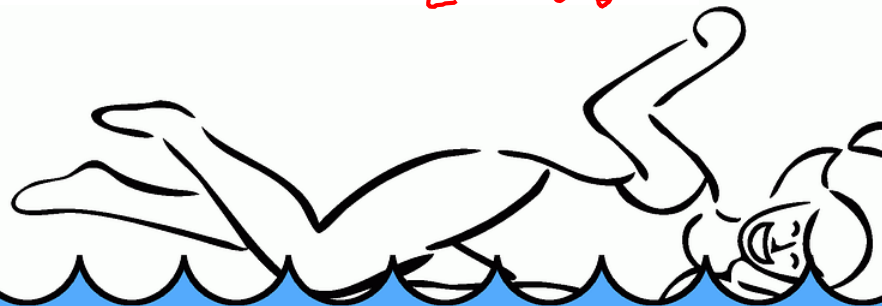
- The distribution for male Olympic swimmers can be described by  $N(24, 3.25)$   $z = \frac{19 - 24}{2.5} = -1.54$
- The distribution for female Olympic swimmers can be described by  $N(22.5, 2.5)$   $z = \frac{19 - 22.5}{2.5} = -1.4$

• Determine who is actually older compared to other swimmers of the same gender:

- A female who is 19 or a male who is 19.
- Who is actually younger compared to other swimmers of the same gender?
- A female who is 25 or a male who is 25

$$z \rightarrow 1$$

$$z \rightarrow 0.3$$



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# Swimmer Data

$$Z = \frac{X - \bar{X}}{S}$$

- The distribution for male Olympic swimmers can be described by  $N(24, 3.25)$
- Create a ~~Box Plot~~ for the data

$$-0.67 = \frac{X - 24}{3.25}$$

$X =$

IQR

Q1

25<sup>th</sup> %ile

0.2500

$Z = -0.67$

Q3

75<sup>th</sup> %ile

0.7500

$Z = +0.67$

#41  
#42C

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ESSENTIAL

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# AP Stats Topics

## I. Exploring Data: Describing patterns and departures from patterns (20%–30%)

*Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis should be placed on interpreting information from graphical and numerical displays and summaries.*

### B. Summarizing distributions of univariate data

1. Measuring center: median, mean
2. Measuring spread: range, interquartile range, standard deviation
3. Measuring position: quartiles, percentiles, standardized scores (z-scores)
4. Using boxplots
5. The effect of changing units on summary measures

## III. Anticipating Patterns: Exploring random phenomena using probability and simulation (20%–30%)

*Probability is the tool used for anticipating what the distribution of data should look like under a given model.*

### C. The normal distribution

1. Properties of the normal distribution
2. Using tables of the normal distribution
3. The normal distribution as a model for measurements

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# What is on the test?

- Shift and scale of data – effects on center and spread statistics
- Converting between z and percentile and using those to make decisions
- Drawing a normal model with appropriate units
- Using the Empirical Rule (68%, 95%, 99.7%)
- Cumulative multiple choice questions

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# Multiple Choice Practice



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# Homework

- Gather the homework assignments from the chapter to turn in:
  - Notes from reading of chapter 6
  - P 131 (25, 26, 29, 30)
  - P 132-3 (17, 37, 39, 41, 38, 41, 42)

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