

## 2.1: Identifying location in a distribution: percentiles and z-scores

Read 84-85

What is a percentile? On a test, is a student's percentile the same as the percent correct?

Alternate Example: Wins in Major League Baseball

The stemplot below shows the number of wins for each of the 30 Major League Baseball teams in 2009.

```
5 | 9
6 | 2455
7 | 00455589
8 | 0345667778
9 | 123557
10 | 3
```

Key: 5|9 represents a team with 59 wins.

Calculate and interpret the percentiles for the Colorado Rockies who had 92 wins, the New York Yankees who had 103 wins, and the Cleveland Indians who had 65 wins.

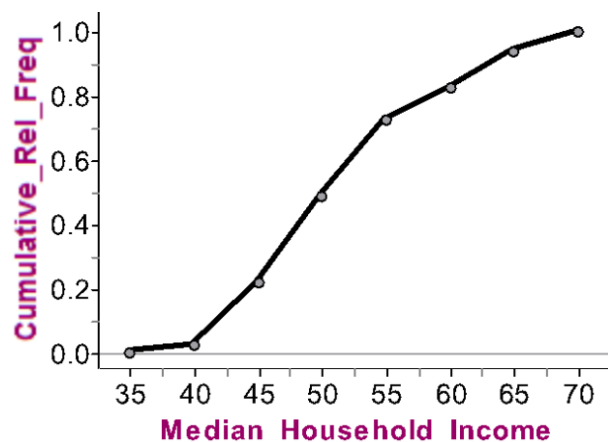
Read 86–89

Alternate Example: State Median Household Incomes

Here is a cumulative relative frequency graph showing the distribution of median household incomes for the 50 states and the District of Columbia.

a) California, with a median household income of \$57,445, is at what percentile? Interpret this value.

b) What is the 25<sup>th</sup> percentile for this distribution? What is another name for this value?



c) Where is the graph the steepest? What does this indicate about the distribution? Macy, a 3-year-old female is 100 cm tall. Brody, her 12-year-old brother is 158 cm tall. Obviously, Brody is taller than Macy—but who is taller, relatively speaking? That is, relative to other kids of the same ages, who is taller? Discuss how you arrive at your answer. According to the Centers for Disease Control and Prevention, the heights of three-year-old females have a mean of 94.5 cm and a standard deviation of 4 cm. The mean height for 12-year-olds males is 149 cm with a standard deviation of 8 cm.

Read 89–91

How do you calculate and interpret a standardized score ( $z$ -score)? Do  $z$ -scores have units? What does the sign of a standardized score tell you? (this is super-duper important!!!!)

Alternate Example: Home run kings

The single-season home run record for major league baseball has been set just three times since Babe Ruth hit 60 home runs in 1927. Roger Maris hit 61 in 1961, Mark McGwire hit 70 in 1998 and Barry Bonds hit 73

Year	Player	HR	Mean	SD
1927	Babe Ruth	60	7.2	9.7
1961	Roger Maris	61	18.8	13.4
1998	Mark McGwire	70	20.7	12.7
2001	Barry Bonds	73	21.4	13.2

in 2001. In an absolute sense, Barry Bonds had the best performance of these four players, because he hit the most home runs in a single season. However, in a relative sense this may not be true. Baseball historians suggest that hitting a home run has been easier in some eras than others. This is due to many factors, including quality of batters, quality of pitchers, hardness of the baseball, dimensions of ballparks, and possible use of performance-enhancing drugs. To make a fair comparison, we should see how these performances rate relative to others hitters during the same year. Calculate the standardized score for each player and compare.

In 2001, Arizona Diamondback Mark Grace's home run total had a standardized score of  $z = -0.48$ . Interpret this value and calculate the number of home runs he hit.

**HW page 105 (1, 5, 9, 11, 13, 15)**

## 2.1 Transforming Data and Density Curves

Corresponds to pages 92–97:

*Guess the width of the room in feet.* \_\_\_\_\_

*Create a dotplot of the results from the class.*

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The actual length of the room in feet is \_\_\_\_\_

Now calculate the errors.  $\text{Error} = \text{guess} - \text{actual value}$ .

Make a dotplot of these results:

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What is the effect of adding or subtracting a constant from each observation?

What is the effect of multiplying or dividing each observation by a constant?

In 2010, Taxi Cabs in New York City charged an initial fee of \$2.50 plus \$2 per mile. In equation form,  $\text{fare} = 2.50 + 2(\text{miles})$ . At the end of a month a businessman collects all of his taxi cab receipts and analyzed the distribution of fares. The distribution was skewed to the right with a mean of \$15.45 and a standard deviation of \$10.20.

a) What are the mean and standard deviation of the lengths of his cab rides in miles?

b) If the businessman standardized all of the fares, what would be the shape, center, and spread of the distribution?

Read 99–103

What is a density curve? When would we use a density curve? Why?

How can you identify the mean and median of a density curve?

**HW page 107 (19–31 odd, 40)**