

2.1 Describing Location

Percentile: the p^{th} percentile of a distribution is the value with p percent of the observations less than it.

Ex: The stemplot shows win totals for all 30 MLB teams in 2012:

wins

5	5
6	1 4 6 8 9 9
7	2 3 4 5 6 9
8	1 1 3 5 6 8 8 9
9	0 3 3 4 4 5 7 8

a) Find the percentile for the Twins with 66 wins.

$$\frac{3}{30} = 10\% \quad \boxed{10^{\text{th}} \text{ percentile}}$$

b) Find the percentile for the Rangers and Orioles with 93 wins

$$\frac{22}{30} = 73\%$$

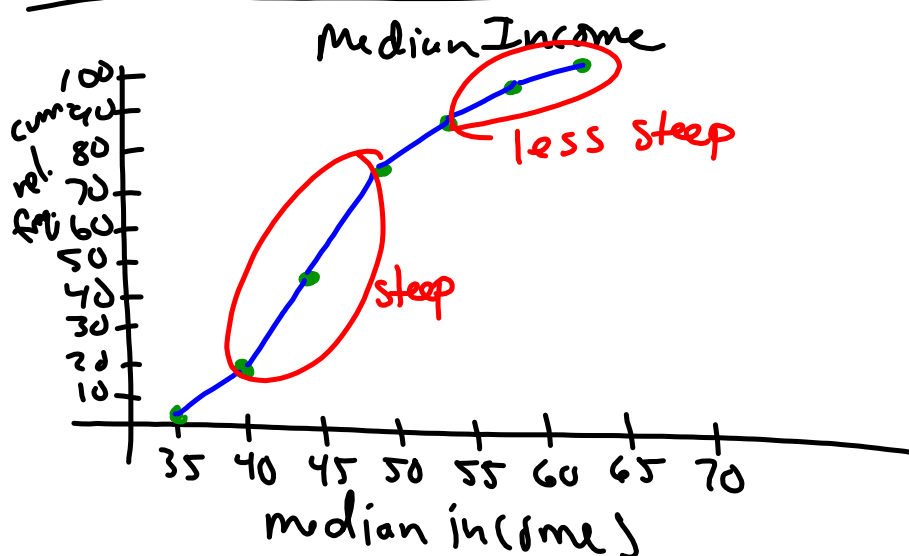
73rd percentile

Cumulative Relative Frequency Table

Ex: Median income

Median income (\$1000's)	Frequency	Relative Freq	Cumulative freq	Cum. rel. freq.
35-40	1	$1/51 = 2.0\%$	1	2.0%
40-45	10	$10/51 = 19.6\%$	11	$11/51 = 21.6\%$
45-50	14	$14/51 = 27.5\%$	25	$25/51 = 49\%$
50-55	12	$12/51 = 23.5\%$	37	$37/51 = 72.5\%$
55-60	5	$5/51 = 9.8\%$	42	$42/51 = 82.4\%$
60-65	6	$6/51 = 11.8\%$	48	$48/51 = 94.1\%$
65-70	3	$3/51 = 5.8\%$	51	$51/51 = 100\%$

Cumulative Relative Frequency Graph



z - Scores (standardized scores)

If x is an observation from a distribution that has known mean and standard deviation the z score is:

$$z = \frac{X - \text{mean}}{\text{Standard deviation}} = \frac{X_i - \bar{X}}{s}$$

Ex: In 2012, the mean number of wins in MLB was 81 with $s = 11.9$ wins. Find the z -Score for:

a) Yankees with 95 wins

$$z = \frac{X_i - \bar{X}}{s} = \frac{95 - 81}{11.9} = 1.18$$

b) Mets w/ 74 wins

$$z = \frac{74 - 81}{11.9} = -.59$$

Properties of z-scores

- ① not in the same units as the observations
they are measured in standard deviations
- ② They are directional. Positive is above the mean,
negative is below the mean.
- ③ DO NOT have to have a Normal Distribution
to find a z-score. Any distribution can be used to calculate
z-scores.

Transformations of data

Test scores:

51, 68, 71, 73, 79, 82, 85, 85, 88, 93

Effects of Adding a constant, a

- ① adds or subtracts a to the measure of center & location
(\bar{x} , M , Q_1 , Q_3 , P)
- ② spread and shape remain unchanged.

Effects of multiplying a constant, b

- ① multiplies or divides the measure of center by b
- ② multiplies the spread by b
- ③ shape does not change.