mean $\bar{x} = (\sum x_i)/n = (x_1 + \cdots x_n)/n$

standard deviation The sample standard deviation is

$$s = \frac{1}{n-1}\sum_i (x_i - \bar{x})^2$$

median The median data point of a data set with n numbers is the $(n+1)/2$th largest value. If n is even, one averages to find this.

IQR The IQR is the difference between the quartiles: $Q_3 - Q_1$.

z-score The sample z-score is

$$z = \frac{x - \bar{x}}{s}$$

distributions The distribution of a discrete random variable, X, is a specification of all possible values , k which X can be *and* the probabilities $P(X = k)$. For a continuous random variable, the distribution is specified by a density. Areas under the density give probabilities.

population mean For a discrete random variable, the expected value or mean is

$$\mu = E(X) = \sum_k P(X = k)$$

For a continuous random variable, the mean may be estimated as a balancing point of the density.

multiplication rule If there are k stages and the ith stage has n_i possible outcomes, then there are

$$n_1 \cdot n_2 \cdot \cdots \cdot n_k$$

possible outcomes

Permutations The number of permutations of n distinct objects taken r at a time is

$${}_nP_r = n \cdot (n-1) \cdot \cdots \cdot (n-r+1) = \frac{n!}{(n-r)!}$$

Combinations The number of combinations of n distinct objects taken r at a time is

$$\binom{n}{r} = \frac{n!}{(n-r)!r!} = \frac{{}_nP_r}{r!}.$$