# STAT PHYS SCIENCE Final Cheat Sheet

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November 16, 2021

## 1 Measurement of Variation or Dispersion

### 1.1 Range

$$R = x_{max} - x_{min} \tag{1}$$

### 1.2 Average Deviation (A.D.)

$$A.D. = \frac{\sum_{i=1}^{n} |x_i - \mu|}{n} \tag{2}$$

### 1.3 Standard Deviation (S.D.)

#### 1.3.1 Standard Deviation (Population)

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(x_i - \mu)^2}{N}} = \sqrt{\frac{\sum_{i=1}^{N} x_i - N\mu^2}{N}} \tag{3}$$

#### 1.3.2 Standard Deviation (Sample)

$$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \mu)^2}{n-1}} = \sqrt{\frac{\sum_{i=1}^{n} x_i - N\mu^2}{n-1}} \tag{4}$$

### 1.4 Skewness

#### 1.4.1 Skewness (Population)

$$S_k = \sum_{i=1}^{N} \frac{[x_i - \mu]^3}{\sigma^3 N} \tag{5}$$

if $S_k = 0$ the data is normal
else if $S_k > 0$ the data is skwed right
else if $S_k < 0$ the data is skwed left

#### 1.4.2 Skewness (Sample)

$$s_k = \frac{n^2}{(n-1)(n-2)} \sum_{i=1}^{n} \frac{[x_i - \bar{x}]^3}{s^3 n} \tag{6}$$

if $-1 \leq s_k \leq 1$ the data is normal
else if $s_k > 1$ the data is skwed right
else if $s_k < -1$ the data is skwed left

### 1.5 Relative Kurtosis

A measure of the peakedness of a distribution

#### 1.5.1 Relative Kurtosis (Population)

$$K = \sum_{i=1}^{N} \frac{[x_i - \mu]^4}{\sigma^4 N} - 3 \tag{7}$$

if $K = 0$ the data is normal
else if $K > 0$ the data is higher than normal
else if $K < 0$ the data is lower than normal

#### 1.5.2 Relative Kurtosis (Sample)

$$k = \frac{n^2(n+1)}{(n-1)(n-2)(n-3)} \sum_{i=1}^{n} \frac{[x_i - x]^4}{s^4 n} - \frac{3(n-1)^2}{(n-2)(n-3)} \tag{8}$$

if $-1 \leq k \leq 1$ the data is normal
else if $k > 1$ the data is higher than normal
else if $k < -1$ the data is lower than normal