

# STAT PHYS SCIENCE Midterm Cheat Sheet

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## 1 Measure of Central Tendency      3 Measurement of Variation or Dispersion

### 1.1 Mean

$$\mu = \frac{\sum_{i=1}^N x_i}{N} \quad (1)$$

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n} \quad (2)$$

### 1.2 Median

$$M = x_{(\frac{N+1}{2})} \quad (3)$$

## 2 Quantiles

### 2.1 Quartiles

$$Q_i = x_{(i(\frac{N-1}{4}))} \quad (4)$$

### 2.2 Deciles

$$D_i = x_{(i(\frac{N-1}{10}))} \quad (5)$$

### 2.3 Percentiles

$$P_i = x_{(i(\frac{N-1}{100}))} \quad (6)$$

### 3.1 Range

$$R = x_{max} - x_{min} \quad (7)$$

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

$$A.D. = \frac{\sum_{i=1}^n |x_i - \mu|}{n} \quad (8)$$

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

#### 3.3.1 Standard Deviation (Population)

$$\sigma = \sqrt{\frac{\sum_{i=1}^N (x_i - \mu)^2}{N}} = \sqrt{\frac{\sum_{i=1}^N x_i^2 - N\mu^2}{N}} \quad (9)$$

#### 3.3.2 Standard Deviation (Sample)

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \mu)^2}{n-1}} = \sqrt{\frac{\sum_{i=1}^n x_i^2 - N\mu^2}{n-1}} \quad (10)$$

### 3.4 Quartile Deviation

$$Q.D. = \frac{Q_3 - Q_1}{2} \quad (11)$$

### 3.5 Skewness

#### 3.5.1 Skewness (Population)

$$S_k = \sum_{i=1}^N \frac{[x_i - \mu]^3}{\sigma^3 N} \quad (12)$$

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

#### 3.5.2 Skewness (Sample)

$$s_k = \sum_{i=1}^n \frac{[x_i - \bar{x}]^3}{s^3 n} \quad (13)$$

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

### 3.6 Kurtosis

A measure of the peakedness of a distribution

#### 3.6.1 Kurtosis (Population)

$$K = \sum_{i=1}^N \frac{[x_i - \mu]^4}{\sigma^4 N} \quad (14)$$

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

#### 3.6.2 Kurtosis (Sample)

$$k = \dots \quad (15)$$

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