STAT PHYS SCIENCE Midterm Cheat Sheet

Noppakorn Jiravaranun

September 29, 2021

1 Measure of Central Tendency

1.1 Mean

$$\mu = \frac{\sum_{i=1}^{N} x_i}{N} \tag{1}$$

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} \tag{2}$$

1.2 Median

$$M = x_{\left(\frac{N+1}{2}\right)} \tag{3}$$

2 Quantiles

2.1 Quartiles

$$Q_i = x_{\left(i\left(\frac{N-1}{4}\right)\right)} \tag{4}$$

2.2 Deciles

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

2.3 Percentiles

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

3 Measurement of Variation or Dispersion

3.1 Range

$$R = x_{max} - x_{min} \tag{7}$$

3.2 Average Deviation (A.D.)

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

3.3 Standard Deviation (S.D.)

3.3.1 Population

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

3.3.2 Sample

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

3.4 Quatile Deviation

$$Q.D. = \frac{Q_3 - Q_1}{2} \tag{11}$$

3.5 Skewness

3.5.1 Skewness (Population)

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

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

3.5.2 Skewness (Sample)

$$s_k = \sum_{i=1}^{N} \frac{[x_i - \bar{x}]^3}{s^3 N} \tag{13}$$

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