

POS 3713 Midterm Exam #2
Formula Sheet

Note: Xbar denotes sample mean

Descriptive Statistics

1) *Measures of central tendency*

Mean: $\bar{X} = \Sigma X / N$

2) *Measures of Dispersion*

$$IQV = \frac{k(N^2 - \Sigma f^2)}{N^2(k-1)}$$
 where k = # of categories, Σf^2 = sum of frequencies squared,
N = sample size

Variance: $s^2 = \frac{\Sigma(X - \bar{X})^2}{N - 1}$ Standard deviation: $s = \sqrt{s^2}$

Standard error for sampling distribution of the mean: $s.e. = \sigma / \sqrt{N}$

Inferential Statistics

1) *Confidence Intervals* (Note: $\alpha = 1 - \text{confidence level}$; 95% confidence, $\alpha = .05$)

For the mean:

A) If σ is known or $N \geq 100$ (replace σ with s if $N > 100$ and σ is unknown):

$$\mu = \bar{X} \pm Z^*(\sigma / \sqrt{N})$$

B) If σ is unknown and $N < 100$:

$$\mu = \bar{X} \pm t^*(s / \sqrt{N - 1})$$

$$df = N - 1$$

For equations A-B above:

\bar{X} = sample mean

Z, t = Z or t score for two-tailed test

σ = population standard deviation

s = sample standard deviation

For the proportion:

$$\pi = P_s \pm Z\sqrt{P_u(1-P_u)/N}$$

where P_s = sample proportion, P_u = population proportion (assume $P_u = .5$ if it is unknown)

2) *Hypothesis Testing*

Hypothesis Test for the Sample Mean

A) If σ is known or $N > 100$ (replace σ with s if $N > 100$ and σ is unknown):

$$z = \frac{\bar{X} - \mu}{\sigma / \sqrt{N}}$$

B) If σ is unknown and $N < 100$:

$$t = \frac{\bar{X} - \mu}{s / \sqrt{N - 1}} \quad df = N - 1$$

Hypothesis Test for the Proportion

$$z = \frac{P_s - P_u}{\sqrt{P_u(1-P_u)/N}}$$

Z and t scores

$$Z = \frac{\bar{X} - \mu}{\sigma} \quad \text{or} \quad \frac{\bar{X} - \bar{X}}{s}$$

Student t: used for small samples ($N < 100$ & σ is unknown), $t = \frac{\bar{X} - \bar{X}}{s}$