Math 656
December 9, 2012

Formula Sheet

Not for use on Final Exam, Use for Review Purposes only

Basics

$$\bar{x} = \frac{\sum x_i}{n}$$

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

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

Probability

$$\begin{aligned}
P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\
&= P(A) + P(B) \text{ If A and B are mutually exclusive} \\
P(A \cap B) &= P(A) \cdot P(B) \text{ If A and B are independent} \\
P(A|B) &= \frac{P(A \cap B)}{P(B)} \\
P(A|B) &= P(A) \text{ If A and B are independent} \\
\binom{N}{n} &= \frac{N!}{n!(N-n)!}
\end{aligned}$$

Discrete Random Variables

$$\begin{aligned}
\mu &= \sum xp(x) \\
\sigma &= \sqrt{\sum (x-\mu)^2 p(x)}
\end{aligned}$$

Binomial Random Variables

$$\begin{aligned}
\mu &= np \\
\sigma &= \sqrt{npq}
\end{aligned}$$

Confidence Intervals and Test of Hypothesis

CI for...	CI	Test Statistic	Rejection Region
μ	$\bar{x} = \pm(z_{\alpha/2})\frac{\sigma}{\sqrt{n}}$	$z = \frac{\bar{x}-\mu}{\sigma/\sqrt{n}}$	$\lvert z\rvert > z_{\alpha/2}$
μ	$\bar{x} = \pm(t_{\alpha/2})\frac{\sigma}{\sqrt{n}}$	$t = \frac{\bar{x}-\mu}{s/\sqrt{n}}$	$\lvert t\rvert > t_{\alpha/2}$, $(n-1)$ df
p	$\hat{p} \pm z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}}$	$z = \frac{\hat{p}-p_0}{\sqrt{p_0q_0/n}}$	$\lvert z\rvert > z_{\alpha/2}$
σ^2	$\frac{(n-1)s^2}{\chi^2_{\alpha/2}} \leq \sigma^2 \leq \frac{(n-1)s^2}{\chi^2_{1-\alpha/2}}$, $(n-1)$ df	$\chi^2 = \frac{(n-1)s^2}{\sigma_0^2}$	$\chi^2 < \chi^2_{1-\alpha/2}$ or $\chi^2 > \chi^2_{\alpha/2}$, $(n-1)$df
$\mu_1 - \mu_2$	$\bar{x_1} - \bar{x_2} \pm z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$	$z = \frac{(\bar{x_1}-\bar{x_2})-(\mu_1-\mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}}$	$\lvert z\rvert > z_{\alpha/2}$
$\mu_1 - \mu_2$	$(\bar{x_1} - \bar{x_2}) \pm t_{\alpha/2}\sqrt{s_p^2\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}$	$t = \frac{(\bar{x_1}-\bar{x_2})-(\mu_1-\mu_2)}{}\sqrt{s_p^2\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}$	$\lvert t\rvert > t_{\alpha/2}$, (n_1+n_2-2) df
$p_1 - p_2$	$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2}\sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$		
		$s_p^2 = \frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}$	