Math 3070-1 Final Exam

- **Table for standard tests**

H_0	test statistic	H_1	reject H_0 if:
$\mu = \mu_0$	$Z = \dfrac{\bar{X} - \mu_0}{\sigma/\sqrt{n}}$	$\begin{cases} \mu < \mu_0 \\ \mu > \mu_0 \\ \mu \neq \mu_0 \end{cases}$	$\begin{cases} Z < -z(\alpha) \\ Z > z(\alpha) \\ \lvert Z\rvert > z(\alpha/2) \end{cases}$
$\mu = \mu_0$	$T = \dfrac{\bar{X} - \mu_0}{S/\sqrt{n}}$	$\begin{cases} \mu < \mu_0 \\ \mu > \mu_0 \\ \mu \neq \mu_0 \end{cases}$	$\begin{cases} T < -t_{n-1}(\alpha) \\ T > t_{n-1}(\alpha) \\ \lvert T\rvert > t_{n-1}(\alpha/2) \end{cases}$
$\mu_1 = \mu_2$	$Z = \dfrac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$	$\begin{cases} \mu_1 < \mu_2 \\ \mu_1 > \mu_2 \\ \mu_1 \neq \mu_2 \end{cases}$	$\begin{cases} Z < -z(\alpha) \\ Z > z(\alpha) \\ \lvert Z\rvert > z(\alpha/2) \end{cases}$
$\mu_1 = \mu_2$ σ_1 and σ_2 both known	$T = \dfrac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$	$\begin{cases} \mu_1 < \mu_2 \\ \mu_1 > \mu_2 \\ \mu_1 \neq \mu_2 \end{cases}$	$\begin{cases} Z < -z(\alpha) \\ Z > z(\alpha) \\ \lvert Z\rvert > z(\alpha/2) \end{cases}$
$\mu_1 = \mu_2$ $\sigma_1 = \sigma_2$, both unknown $S_p := \sqrt{\dfrac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}}$	$T = \dfrac{\bar{X}_1 - \bar{X}_2}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$	$\begin{cases} \mu_1 < \mu_2 \\ \mu_1 > \mu_2 \\ \mu_1 \neq \mu_2 \end{cases}$	$\begin{cases} Z < -z(\alpha) \\ Z > z(\alpha) \\ \lvert Z\rvert > z(\alpha/2) \end{cases}$
$p = p_0$ n large	$Z = \dfrac{\hat{p} - p_0}{\sqrt{p_0(1-p_0)/n}}$	$\begin{cases} p < p_0 \\ p > p_0 \\ p \neq p_0 \end{cases}$	$\begin{cases} Z < -z(\alpha) \\ Z > z(\alpha) \\ \lvert Z\rvert > z(\alpha/2) \end{cases}$

- The $\boldsymbol{\chi^2}$ **Statistic**: $\chi^2 = \sum_{i=1}^{n} \dfrac{(o_i - e_i)^2}{e_i}$, where the o_i's are the observed counts, and e_i's are the expected counts [under H_0]