m. $X \sim Normal(\mu_1, \sigma_1^2)$

n. $Y \sim Normal(\mu_2, \sigma_2^2)$

$$\frac{(\bar{X}-\bar{Y})-(\mu_1-\mu_2)}{\sqrt{\frac{\sigma_1^2}{m}+\frac{\sigma_2^2}{n}}} \sim Normal(0,1)$$

$$S_p^2 = \frac{(m-1)S_X^2+(n-1)S_n^2}{m+n-2}$$

if $\sigma_1=\sigma_2$

then $E[S_p^2]=E[S_X^2]=E[S_Y^2]=\sigma^2$

$$\frac{(\bar{X}-\bar{Y})-(\mu_1-\mu_2)}{\sqrt{\frac{S_p^2}{m}+\frac{S_p^2}{n}}} \sim t(m+n-2)$$

$$\mu_1-\mu_2=(\bar{X}-\bar{Y}) \pm Z_{\frac{\alpha}{2}}\left(\sqrt{\frac{\sigma_1^2}{m}+\frac{\sigma_2^2}{n}}\right)$$

$$\mu_1-\mu_2=(\bar{X}-\bar{Y}) \pm t_{\frac{\alpha}{2}}(m+n-2)\left(\sqrt{\frac{S_p^2}{m}+\frac{S_p^2}{n}}\right)$$

$$S_p^2=\frac{(m-1)S_1^2+(n-1)S_2^2}{m+n-2}$$

$S_p \to$ the pooled estimate of standard deviation

$\bar{P}=\frac{1}{n}\sum_{i=1}^{n}X_i \quad X_i \sim Bernoulli(p)$

$E[\bar{P}]=P \quad Var(\bar{P})=\frac{P(1-P)}{n}$

$$\frac{\bar{P}-P}{\sqrt{\frac{P(1-P)}{n}}} \sim Normal(0,1)$$

confidence interval

$$P \in \bar{P} \pm Z_{\frac{\alpha}{2}}\left(\sqrt{\frac{\bar{P}(1-\bar{P})}{n}}\right)$$

$\cancel{\mu_1-\mu_2=\bar{P}_1-\bar{P}_2}$

$$\mu \in \bar{X} \pm t_{\frac{\alpha}{2}}(n-1)\left(\sqrt{\frac{S^2}{n}}\right).$$

strong | Moderate | Weak | Inconclusive

0 H_1 0.01 | 0.05 H_1 0.1 | H_0 1

拒绝域 H_0 $W=\left\{\left|\frac{\bar{X}-\mu}{\sqrt{\frac{S^2}{n}}}\right| \geq t_{\frac{\alpha}{2}}(n-1)\right\}$

$$W=\left\{\left|\frac{\bar{X}-\mu}{\sqrt{\frac{\sigma^2}{n}}}\right| \geq Z_{\frac{\alpha}{2}}\right\}$$

$$P\left\{\left|\frac{\bar{X}-\mu}{\sqrt{\frac{\sigma^2}{n}}}\right| \geq t(x)\right\}=\alpha$$

$\Rightarrow$ ~~Zmin(P ≤ Z~~ $\alpha \to$ P-value.

This is strong evidence against the null hypotheoio, suggesting the probability of ________ is different t________

there is difference in the probability of miscarriage between _