TSTA 301
FINAL EXAM FORMULA SHEET

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}, \qquad \mu = \frac{\sum_{i=1}^{N} x_i}{N} \qquad s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}, \qquad \sigma = \sqrt{\frac{\sum (x_i - \mu)^2}{N}}$$

Hypergeometric	**Binomial**	**Poisson**
$P(x \mid N, D, n) = \frac{{}_D C_x \cdot {}_{(N-D)} C_{(n-x)}}{{}_N C_n}$	$P(x) = {}_n C_x \cdot P^x \cdot (1-p)^{n-x}$	$P(x) = \frac{\mu^x \cdot e^{-\mu}}{x!}$
$\mu = \frac{nD}{N}$	$\mu = np$	$\mu = \sigma^2$
$\sigma^2 = \frac{nD}{N}\left(1 - \frac{D}{N}\right)\left(\frac{N-n}{N-1}\right)$	$\sigma^2 = npq = np(1-p)$	

Normal distribution : $z = \frac{x - \mu}{\sigma}$

Test Statistics : $z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}, \qquad t = \frac{\bar{x} - \mu}{s/\sqrt{n}} \quad df = n - 1$

Confidence interval for a large sample: $100(1-\alpha)\%C.I. = \bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

Confidence interval for a small sample: $100(1-\alpha)\%C.I. = \bar{x} \pm t_{\alpha/2, n-1} \frac{s}{\sqrt{n}}$

Test statistics for matched pairs: $t = \frac{\bar{d} - \mu_d}{s_d/\sqrt{n}}$

where $\bar{d} = \frac{\sum d}{n}$ and $s_d = \sqrt{\frac{\sum (d - \bar{d})^2}{n-1}}$

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Test Stairstics of Independent test : $z = \dfrac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$

Test statistics for $\mu_1 - \mu_2$ when $\sigma_1^2 = \sigma_2^2$ $\quad t = \dfrac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{s_p^2\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}}$ $\quad df = n_1 + n_2 - 2$

$$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_1 - 1)s_2^2}{n_1 + n_2 - 2}$$

Coefficient of correlation: $\quad r = \dfrac{n\sum xy - \sum x \sum y}{\sqrt{[n\left(\sum x^2\right) - \left(\sum x\right)^2][n\left(\sum y^2\right) - \left(\sum y\right)^2]}}$

Regression Line: $y = a + b\,x$ $\qquad b = \dfrac{n\sum xy - \sum x \sum y}{n\left(\sum x^2\right) - \left(\sum x\right)^2}$ $\qquad a = \dfrac{\sum y}{n} - b\dfrac{\sum x}{n}$