S12 - 0.0 - Statistics Cheat Sheet

$\sigma = \sqrt{\sigma^2}$

Compliment

$p = 1 - q$

Mean

$\mu = \frac{\sum x_i}{n}$

Frequency

$\mu = \frac{\sum f_i x_i}{n}$

Weighted Mean

$\bar{x} = \frac{\sum(wx)}{\sum w}$

Midrange

$\frac{Max + Min}{2}$

Median position:

$\frac{n+1}{2}$

Range:

$x_{max} - x_{min}$

Expected Value

$\mu = \sum x_i p_i(x)$

Standard Deviation (StDev)

$\sigma = \sqrt{\frac{\sum(x_i - \mu)^2}{N}}$ Population

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

$s = \sqrt{\frac{\sum x_i^2 - \mu^2}{N}}$

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

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

$s = \frac{Range}{4}$

$df = n - 1$

Variance

$\sigma^2 = \sum(x-\mu)^2 p(x)$

$\sigma^2 = \sum x^2 p(x) - \mu^2$

Coefficient of Variation

$CV = \frac{\sigma}{\mu}$

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

Critical Values (2/1 Tail)

$90\% = \pm 1.645/1.28$

$95\% = \pm 1.96/1.645$

$99\% = \pm 2.575/2.33$

Sampling

$\sigma_S = \sqrt{\frac{pq}{n}}$

$\sigma = \frac{\sigma}{\sqrt{n}}\sqrt{\frac{N-n}{N-1}}$

Confidence Interval

$CI = @ \pm E$

$(@ - E, @ + E)$

$@ - E < @ < @ + E$

Standard Error of Mean

$\sigma = \frac{\sigma}{\sqrt{n}}$

Margin of Error

$E = z^*_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$

$E = t_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}}$

Test Statistic for Mean

$z = \frac{x - \mu}{\frac{\sigma}{\sqrt{n}}}$ $t = \frac{x - \mu}{\frac{s}{\sqrt{n}}}$

σ is known, $n > 30$ & Normally Distributed or* $n > 30$

σ is NOT known,

$z = \frac{x - \mu}{\sigma}$ Single Data

$n \geq 0.05N$

$\sigma_s = \frac{\sigma}{\sqrt{n}}\sqrt{\frac{N-n}{N-1}}$

Test Statistic for Proportion

$z = \frac{\bar{p} - p}{\sqrt{\frac{pq}{n}}}$

$\sigma_p = \sqrt{\frac{pq}{n}}$

$np \geq 5, nq \geq 5$

$n \geq 30, npq \geq 10$

$n > 0.05N$

Test Statistic for Standard Deviation

$X^2 = \sum \frac{(O - E)^2}{E}$

$X^2 = \frac{(n-1)s^2}{\sigma}$

& Norm Dist

Binomial

$\mu = np$

$\sigma = \sqrt{npq}$

Binomial Distribution

$p(x) = {}_nC_x p^x q^{n-x}$

Poisson

$P(x) = \frac{\mu^x e^{-\mu}}{x!}$

$P(x \leq a) = 1 - e^{-\frac{a}{\mu}}$

$\sigma^2 = \mu$

$n = \left[\frac{z_{\frac{\alpha}{2}}\sigma}{E}\right]^2$ Round Up

$n = \frac{\left(z_{\frac{\alpha}{2}}\right)^2}{E^2} pq$

$n = \frac{\left(z_{\frac{\alpha}{2}}\right)^2}{E^2}(0.25)$

Linear Regression

$y = mx + b$

$m = \frac{n\sum x - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$

$b = \frac{\sum y - m\sum x}{n}$

$m = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sum(x_i - \bar{x})^2}$ $m = r\frac{s_x}{s_y}$

$b = \frac{1}{n-1}\sum\left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right)$

$s_{b_1} = \frac{\sqrt{\frac{\sum(y_i - \bar{y})^2}{n-2}}}{\sqrt{\sum(x_i - \bar{x})^2}}$

Differences of Sample Means/Proportions

$s = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$ $s = \sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}}$

$\hat{p} = \frac{x_1 + x_2}{n_1 + n_2}$

$z_c = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\hat{p}(1 - \hat{p})(\frac{1}{n_1} + \frac{1}{n_2})}}$

Correlation Coefficient

$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)}}$

$r = \frac{1}{n-1}\sum\left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right)$

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