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$\bar{x} = (\Sigma x_i)/n$ Q$_1$ Position = (n+3)/4 Q$_2$ Position = (n+1)/2 Q$_3$ Position = (3n+1)/4

$s^2 = 1/(n-1)*[\Sigma x^2_i - 1/n*(\Sigma x_i)^2]$ St.Dev. = √Var Range = Max - Min IQR = $Q_3 - Q_1$

$CV = (s / \bar{x})*100$ Chebyshev's Rule: at least $[100*(1-1/z^2)]$% where z = the number of st. dev.

$Cov(X,Y) = s_{xy} = 1/(n-1)*[\Sigma x_i y_i - 1/n*(\Sigma x_i)*(\Sigma y_i)]$ $r = s_{xy}/[s_x*s_y]$

$P(A) = 1 - P(A^c)$ P(A or B) = P(A) + P(B) - P(A and B) P(B|A) = P(A and B)/P(A)

P(A and B) = P(B|A)*P(A) Two events are mutually exclusive if P(A and B) = 0

Two events are independent if P(B|A) = P(B)

$E(X) = \Sigma\{x_i*P(X=x_i)\}$ $Var(X) = [\Sigma\{x^2_i *P(X=x_i)\}] - [E(X)]^2$

n! = n*(n-1) *(n-2)*....*1 ${}_nC_x = n!/[x!*(n-x)!]$

Binomial Distribution: ${}_nC_x * p^x * (1-p)^{(n-x)}$ E(X)=n*p Var(X)=n*p*(1-p)

Normal Distribution: $E(X)=\mu$ $Var(X)=\sigma^2$

Standard Normal Distribution: E(Z)=0 Var(Z)=1 $Z=(x-\mu)/\sigma$

Sampling Distribution of $\bar{x}$: $E(\bar{x})=\mu$ $Var(\bar{x})=\sigma^2/n$ $Z=(\bar{x}-\mu)/(\sigma/\sqrt{n})$

Sampling Distribution of $\bar{p}$: $E(\bar{p})=p$ where $\bar{p} = x/n$ $Var(\bar{p})=p(1-p)/n$ $Z=(\bar{p}-p)/\sqrt{[p(1-p)/n]}$

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Inference on μ, Known σ

$Z_{stat} = (\bar{x} - \mu_0) / (\sigma/\sqrt{n})$

C.I.: $\bar{x} \pm Z_{\alpha/2} (\sigma/\sqrt{n})$

Inference on μ, Unknown σ

$t_{stat} = (\bar{x} - \mu_0) / (s/\sqrt{n})$

C.I.: $\bar{x} \pm t_{\alpha/2,n-1} (s/\sqrt{n})$

Inference on p, Large Sample

$Z_{stat} = (\bar{p} - p_0) / \sqrt{[p_0(1-p_0)/n]}$

C.I.: $\bar{p} \pm Z_{\alpha/2} \sqrt{[\bar{p}(1-\bar{p})/n]}$

Inference on $\mu_1 - \mu_2$, Known σs, Indep.Samples

$Z_{stat} = [(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_0] / \sqrt{[(\sigma^2_1/n_1) + (\sigma^2_2/n_2)]}$

C.I.: $(\bar{x}_1 - \bar{x}_2) \pm Z_{\alpha/2}\sqrt{[(\sigma^2_1/n_1) + (\sigma^2_2/n_2)]}$

Inference on $\mu_1 - \mu_2$, Unknown σs, Indep.Samples

$t_{stat} = [(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_0] / \sqrt{[(s^2_1/n_1) + (s^2_2/n_2)]}$ where $df = [s^2_1/n_1 + s^2_2/n_2]^2 / [(s^2_1/n_1)^2/(n_1-1) + (s^2_2/n_2)^2/(n_2-1)]$

C.I.: $(\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2,df}\sqrt{[(s^2_1/n_1) + (s^2_2/n_2)]}$ round df down

Inference on $\mu_1 - \mu_2$, Unknown σs, Indep. Samples, $\sigma^2_1 = \sigma^2_2$ Assumption

$t_{stat} = [(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)_0] / \sqrt{[(s^2_{pool}/n_1) + (s^2_{pool}/n_2)]}$ where $s^2_{pool} = [(n_1-1)s^2_1 + (n_2-1)s^2_2] / (n_1+n_2-2)$

C.I.: $(\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2,n1+n2-2}\sqrt{[(s^2_{pool}/n_1) + (s^2_{pool}/n_2)]}$

Inference on $\mu_1 - \mu_2$, Unknown σs, Dep.Samples ($\mu_1 - \mu_2 = \mu_d$)

$t_{stat} = (\bar{d} - \mu_{d,0}) / (s_d/\sqrt{n})$ where $\bar{d} = (\Sigma d_i)/n$

C.I.: $\bar{d} \pm t_{\alpha/2,n-1} (s_d/\sqrt{n})$ $s^2_d = \{1/(n-1)\}[\Sigma d^2_i - (1/n)(\Sigma d_i)^2]$

Inference on $p_1 - p_2$, Large Indep.Samples, $(p_1 - p_2)_0 = 0$

$Z_{stat} = [(\bar{p}_1 - \bar{p}_2) - 0] / \sqrt{[\{\bar{p}_{pool}(1-\bar{p}_{pool})/n_1\} + \{\bar{p}_{pool}(1-\bar{p}_{pool})/n_2\}]}$ where $\bar{p}_{pool} = (x_1 + x_2) / (n_1 + n_2)$

C.I.: $(\bar{p}_1 - \bar{p}_2) \pm Z_{\alpha/2} \sqrt{[\{\bar{p}_1(1-\bar{p}_1)/n_1\} + \{\bar{p}_2(1-\bar{p}_2)/n_2\}]}$

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$SS_{xx} = \Sigma x^2_i - 1/n(\Sigma x_i)^2$	$SS_{yy} = \Sigma y^2_i - 1/n(\Sigma y_i)^2$	$SS_{xy} = \Sigma x_i y_i - 1/n(\Sigma x_i)(\Sigma y_i)$
$b_1 = SS_{xy}/SS_{xx}$	$b_0 = \bar{y} - b_1 \bar{x}$	$y_{hat} = b_0 + b_1 x$
$df_{Reg} = 1$	$SSR = b_1 {*} SS_{xy} = \Sigma(y_{i,hat} - \bar{y})^2$	$MSR = SSR/df_{Reg}$
$df_{Err} = n - 2$	$SSE = SST - SSR = \Sigma(y_i - y_{i,hat})^2$	$MSE = SSE/df_{Err} = s^2_e$
$df_{Tot} = n - 1$	$SST = SS_{yy} = \Sigma(y_i - \bar{y})^2$	
$r^2 = SSR/SST$	$corr = \star\sqrt{r^2}$	$GlobalF_{stat} = MSR/MSE$
$s_{b1} = \sqrt{[MSE/SS_{xx}]}$	C.I. for β_1: $b_1 \pm t_{\alpha/2,n-2} {*} s_{b1}$	$t_{stat} = [b_1 - 0]/ s_{b1}$

$s_{yhat} = \sqrt{[MSE\{1/n + (x_0 - \bar{x})^2/SS_{xx}\}]}$ C.I. for the mean of y given $x=x_0$: $y_{hat} \pm t_{\alpha/2,n-2} {*} s_{yhat}$

$s_{ind} = \sqrt{[MSE\{1 + 1/n + (x_0 - \bar{x})^2/SS_{xx}\}]} = \sqrt{[MSE+(s_{yhat})^2]}$ for the same x_0

P.I. for an individual new y given $x=x_0$: $y_{hat} \pm t_{\alpha/2,n-2} {*} s_{ind}$