# STATISTICS FORMULAS

$\overline{X} = \dfrac{\sum_{i=1}^{n} X_i}{n}$ IQR = $Q_3 - Q_1$ CV = $\dfrac{s}{\overline{X}}$ x 100%

$\mu = \dfrac{\sum_{i=1}^{n} X_i}{N}$ $s = \sqrt{\dfrac{\sum_{i=1}^{n} (X_i - \overline{X})^2}{n-1}}$ $s^2 = \dfrac{\sum_{i=1}^{n} (X_i - \overline{X})^2}{n-1}$

$\sigma = \sqrt{\dfrac{\sum_{i=1}^{n} (X_i - \mu)^2}{N}}$ $\sigma^2 = \dfrac{\sum_{i=1}^{n} (X_i - \mu)^2}{N}$ $Z = \dfrac{X - \overline{X}}{s}$

$Z = \dfrac{X - \mu}{\sigma}$ $Z = \dfrac{\overline{X} - \mu}{\frac{\sigma}{\sqrt{n}}}$ $Z = \dfrac{\overline{X} - \mu}{\frac{s}{\sqrt{n}}}$

P(A or B) = P(A U B) = P(A) + P(B) if A and B are mutually exclusive
P(A or B) = P(A U B) = P(A) + P(B) - P(A and B)
P(A and B) = P(A $\cap$ B) = P(A) P(B) if A and B are independent
P(A and B) = P(A $\cap$ B) = P(A|B) P(B) if A and B are not independent
= P(B|A) P(A)
P(A|B) = P(A and B) / P(B)
P(B|A) = P(B and A) / P(A) note: P(A and B) = P(B and A)

nPr = n! /(n – r)! nCr = n! / r! (n-r)!
P(x) = nCx $P^x(1 - P)^{n-x}$ mean of binomial ($\mu$) = nP Variance of Binomial ($\sigma^2$) = nP(1 –P)

$r = \dfrac{n\Sigma XY - \Sigma X\,\Sigma Y}{\sqrt{\left(n\Sigma X^2 - (\Sigma X)^2\right)\left(n\Sigma Y^2 - (\Sigma Y)^2\right)}}$ $t_{n-2} = \dfrac{r\sqrt{n-2}}{\sqrt{1-r^2}}$

$b = \dfrac{n\Sigma XY - \Sigma X\,\Sigma Y}{n\Sigma X^2 - (\Sigma X)^2}$ $a = \overline{Y} - b\overline{X}$ $\hat{Y}$ = a + bX

Notation: a is the same as $b_0$ and b is the same as $b_1$

# STATISTICS FORMULAS

$$Z = \frac{\overline{X} - \mu_H}{\frac{\sigma}{\sqrt{n}}}$$

$$\overline{X} \pm Z_\alpha \frac{\sigma}{\sqrt{n}}$$

$$t_{n-1} = \frac{\overline{X} - \mu_H}{\frac{s}{\sqrt{n}}}$$

$$\overline{X} \pm t_{\alpha,\, n-1} \frac{s}{\sqrt{n}}$$

$$Z \approx \frac{P_s - P}{\sqrt{\frac{P(1-P)}{n}}}$$

$$P_s \pm Z_\alpha \sqrt{\frac{P_s(1-P_s)}{n}}$$

$$Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$$\left(\overline{X}_1 - \overline{X}_2\right) \pm Z_\alpha \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

$$Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$\left(\overline{X}_1 - \overline{X}_2\right) \pm Z_\alpha \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$t_{n_1+n_2-2} = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{S^2_{pooled}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

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

$$Z \approx \frac{P_{s1} - P_{s2}}{\sqrt{\overline{P}(1-\overline{P})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

$$\overline{P} = \frac{x_1 + x_2}{n_1 + n_2}$$

$$n = \frac{Z^2 \sigma^2}{e^2}$$

$$n = \frac{Z^2 P(1-P)}{e^2}$$

$$\chi^2 = \frac{(f_o - f_e)^2}{f_e}$$

$$f_e = \frac{row\ total * column\ total}{n}$$