THE FIVE-NUMBER SUMMARY: $Minimum \quad Q_1 \quad Median \quad Q_3 \quad Maximum$

$1.5 \times IQR$ RULE FOR OUTLIERS: $IQR = Q_3 - Q_1$ Anything outside the $1.5 \times IQR$ is an outlier

STANDARD DEVIATION, VARIANCE: $s = \sqrt{\frac{1}{n-1}\sum(x_i - \overline{x})^2}$ $\sigma_{\overline{x}}, s = \frac{\sigma}{\sqrt{n}}$ σ^2, s^2 – pop., sample variance

CORRELATION COEFFICIENT: $r = \frac{1}{n-1}\sum\left(\frac{x_i - \overline{x}}{S_x}\right)\left(\frac{y_i - \overline{y}}{S_y}\right)$

CORRELATION COEFFICIENT SQUARED: r^2 – the percentage of variability explained by the *linear* relationship

LEAST-SQUARES REGRESSION LINE: $\hat{y} = a + bx$ $b = r\frac{S_y}{S_x}$ $a = \overline{y} - b\overline{x}$

RESIDUAL: $Residual = observed\ value - predicted\ value$

PROBABILITY:
All Events: $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
Independent Events: $P(A \text{ and } B) = P(A) \times P(B)$
Disjoint Events: $P(A \text{ and } B) = 0$

BINOMIAL PROBABILITY: $P(X = k) = \binom{n}{k} p^k (1-p)^{n-k}$ $\binom{n}{k} = \frac{n!}{k!(n-k)!}$

BINOMIAL DISTRIBUTION: approximately $N\left(np, \sqrt{np(1-p)}\right)$ $\mu = np$ $\sigma = \sqrt{np(1-p)}$

PROPORTION DISTRIBUTION: approximately $N\left(p, \sqrt{\frac{p(1-p)}{n}}\right)$ $\mu = p$ $\sigma = \sqrt{\frac{p(1-p)}{n}}$

BINOMIAL/PROPORTION INDICATOR: Use the above binomial and proportion distribution formulae if $np \geq 10$

CONTROL LIMITS: $Upper\ Control\ Limit = \overline{x} + 3\frac{\sigma}{\sqrt{n}}$ $Lower\ Control\ Limit = \overline{x} - 3\frac{\sigma}{\sqrt{n}}$

STANDARDIZED VALUES: $z = \frac{x-\mu}{\sigma/\sqrt{n}}$ $t = \frac{x-\mu}{s/\sqrt{n}}$ $z = \frac{x-p}{\sigma}$

TEST STATISTICS (HYPOTHESIS): $z = \frac{\overline{x}-\mu}{\sigma/\sqrt{n}}$ $t = \frac{\overline{x}-\mu}{s/\sqrt{n}}$ $z = \frac{\hat{p}-p}{\sigma}$

SAMPLE SIZE: $n = \left(\frac{z^*\sigma}{m}\right)^2$ $n = \left(\frac{t^*s}{m}\right)^2$ $n = \left(\frac{z^*}{m}\right)^2 p^*(1-p^*)$

MARGIN OF ERROR: z – distribution: $m = z^*\frac{\sigma}{\sqrt{n}}$ t – distribution: $m = t^*\frac{s}{\sqrt{n}}$

CONFIDENCE INTERVAL:
z – distribution: $CI = \overline{x} \pm z^*\frac{\sigma}{\sqrt{n}}$ Proportion: $CI = \hat{p} \pm z^*\sigma$
t – distribution: $CI = \overline{x} \pm t^*\frac{s}{\sqrt{n}}$ Proportion: $CI = \hat{p} \pm z^*s$

DEGREES OF FREEDOM: $degrees\ of\ freedom = n - 1$

STANDARD ERROR: $SE_{\overline{x}} = \frac{s}{\sqrt{n}}$ where the standard deviation is estimated from sample data

TYPE I, II ERROR: H_0 is rejected when H_0 is true, H_0 is accepted when H_a is true