**Formula Sheet**

**Formulas for proportions:**

Confidence interval for proportion: \((\hat{p} - E, \hat{p} + E)\)

Margin of error \(E = z_{\alpha/2} \cdot se = z_{\alpha/2} \cdot \sqrt{\frac{\hat{p} \cdot (1 - \hat{p})}{n}}\)

Given a confidence interval for proportion:

\[
\hat{p} = \frac{\text{lower bound} + \text{upper bound}}{2} \quad E = \frac{\text{upper bound} - \text{lower bound}}{2}
\]

Determining sample size:

\[
n = \frac{z_{\alpha/2}^2 \cdot \hat{p} \cdot (1 - \hat{p})}{E^2}, \text{ if the sample information is given}
\]

\[
n = \frac{z_{\alpha/2}^2 \cdot 0.25}{E^2}, \text{ if no sample information is given}
\]

Test statistic for proportion:

\[
z = \frac{\hat{p} - p_o}{\sqrt{\frac{p_o \cdot (1 - p_o)}{n}}}, \text{ where } \hat{p} \text{ is the sample proportion, } p_o \text{ is the hypothesized value in null hypothesis}
\]

**Formulas for means:**

Confidence interval for mean: \((\bar{x} - E, \bar{x} + E)\)

Margin of error \(E = t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}\)

Determining the sample size: \(n = \frac{4 \cdot s^2}{E^2}, \text{ at a 95% confidence level}\)

Given a confidence interval for mean:

\[
\bar{x} = \frac{\text{lower bound} + \text{upper bound}}{2} \quad E = \frac{\text{upper bound} - \text{lower bound}}{2}
\]

Test statistic for proportion:

\[
z = \frac{\hat{p} - p_o}{\sqrt{\frac{p_o \cdot (1 - p_o)}{n}}}, \text{ where } \hat{p} \text{ is the sample proportion, } p_o \text{ is the hypothesized value in null hypothesis}
\]

Test statistic for mean:

\[
t = \frac{\bar{x} - \mu_o}{\frac{s}{\sqrt{n}}}, \text{ where } \bar{x} \text{ is the sample mean, } \mu_o \text{ is the hypothesized value in null hypothesis}
\]

Expected cell count = (row total * column total) / sample size