§10.1: Two Sample Confidence Intervals for Proportions

Skills:
• Construct a confidence interval for the difference in population proportions
Remember the template!

\[ \text{statistic} \pm (\text{critical value}) \ (\text{measure of variation}) \]
Confidence Interval

A level $C$ confidence interval for the difference of two population proportions is

$$(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1 (1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2 (1 - \hat{p}_2)}{n_2}}$$

provided the samples were obtained randomly, and each of $n_1 \hat{p}_1$, $n_1 (1 - \hat{p}_1)$, $n_2 \hat{p}_2$ and $n_2 (1 - \hat{p}_2)$ are at least 5.
Example

A sample of 73 mail carriers in Cleveland found that 10 had been bitten by an animal.
A sample of 80 mail carriers in Philadelphia found that 16 had been bitten by an animal.
Estimate the difference in bite rates between the two cities with 90% confidence.