EE 381 Homework 4 - Part 2

This homework is due with additional parts in dropbox (beginning of laboratory section) on 4-21-2021.

Derive the confidence interval for the binomial random variable Y with parameters n and p. Assume that $np \geq 5$ and $nq \geq 5$ so that DeMoivre-Laplace applies.

Hint: for the z-score $z = \frac{Y-\mu}{\sigma}$ use $\mu = np$ and $\sigma = \sqrt{npq}$ where $q = 1 - p$. The point estimator (sample proportion) would be $\hat{p} = \frac{Y}{n}$.

Use the definition of a confidence interval from our lectures so that

$$P\left[-z_{\alpha/2} < \frac{Y - \mu}{\sigma} < z_{\alpha/2}\right] \stackrel{\text{def}}{=} 1 - \alpha$$

followed with the necessary algebra.

A survey of 80 recent fatal traffic accidents showed that 46 were alcohol related. Find the 95% confidence interval of the true proportion of fatal alcohol-related accidents.

A researcher wishes to estimate the proportion of adult males who are over 5’ 10’’ tall in Montana. The researcher wishes to be 90% confident that the estimate is within 5% of the true proportion. No estimate of the sample proportion is available, how large should the sample be?