TOOL: For large n and $p \approx 1/2$, the binomial distribution approximates a normal (or gaussian) distribution with mean $\mu = np$ and standard deviation $\sigma = \sqrt{npq}$.

TOOL: For large n and $p \approx 1/2$, the binomial distribution summed from $m = 0$ to $m = r$ approximates the cumulative distribution of a normal (or gaussian) distribution with mean $\mu = np$ and standard deviation $\sigma = \sqrt{npq}$. In other words, the following equation applies:

$$\sum_{m=0}^{r} {}_nC_m p^m q^{n-m} \approx F(z) \quad \text{where} \quad z = \frac{r + \frac{1}{2} - np}{\sqrt{npq}} \quad \text{and} \quad Z \sim n(\mu = 0, \sigma = 1)$$