STA2001: Probability and Statistics I

Computer-based Exercise 11

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The goal of this exercise is to see how normal distribution approximates discrete distribution.

Problem.

- Let $X_1, \ldots, X_n$ be a random sample of size n from Bernoulli distribution $b(1, p)$. Then,

$$Y = \sum_{i=1}^{n} X_i \sim b(n, p).$$

By CLT,

$$Y \sim N(np, np(1-p))$$

as $n \to \infty$.

Let $p = 0.2$ and $n = 100$. Run 1000 simulations to get 1000 realizations of Y. Plot the histogram of relative frequency for these 1000 realizations of Y. Compare it with the plot of $N(np, np(1-p))$ on the range 0-100.