Normal approximation for binomial distributions

• if $X$ has the binomial distribution $B(n, p)$, then

$$
\mu_X = np \quad \text{and} \quad \sigma_X = \sqrt{np(1 - p)}
$$

• compare $B(n, p)$ with the normal distribution that has this mean and standard deviation: $N(np, \sqrt{np(1 - p)})$

Example:
For $B(5, 0.2)$, have $\mu_X = 1$ and $\sigma_X = \sqrt{0.8} = 0.894$. $N(1, 0.984)$ is not a good approximation of $B(5, 2)$.

Example:
For $B(100, 0.3)$, have $\mu_X = 30$ and $\sigma_X = \sqrt{6.3} = 2.51$. $N(30, 2.51)$ is a good approximation of $B(100, 0.3)$. 