Probability Distributions

Binomial Distribution

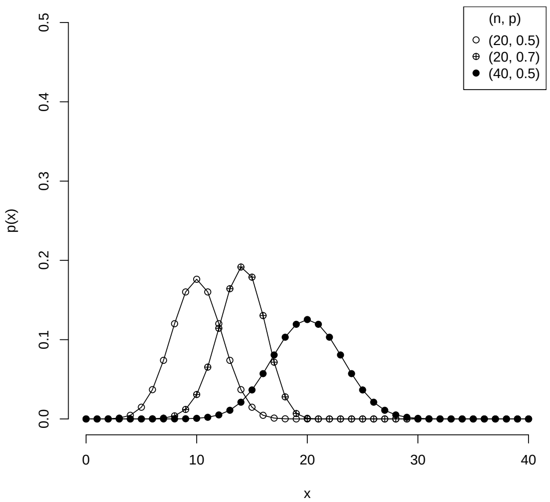

Figure 1: Binomial Distribution

$$X \sim \text{Binomial}(n, p)$$
$$x = 0, 1, 2, \ldots, n$$
$$0 < p < 1$$
$$p(x) = \binom{n}{x} p^x (1-p)^{x-1}$$
$$\mu = E[X] = np$$
$$\sigma^2 = E[(x-\mu)^2] = np(1-p)$$

Poisson Distribution

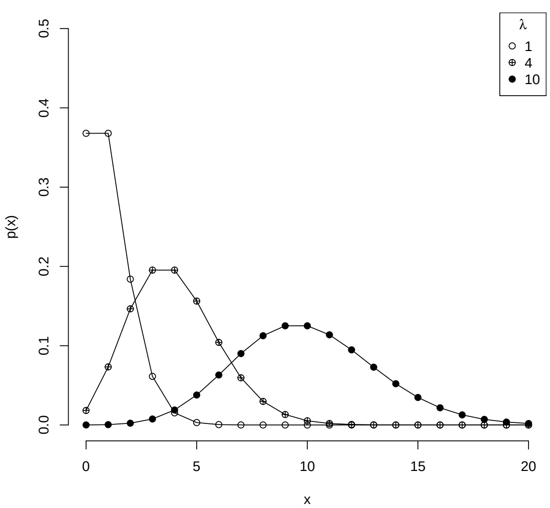

Figure 2: Poisson Distribution

$$X \sim \text{Poisson}(\lambda)$$
$$x = 0, 1, 2, \ldots$$
$$0 < \lambda < \infty$$
$$p(x) = \frac{e^{-\lambda}\lambda^x}{x!}$$
$$\mu = E[X] = \lambda$$
$$\sigma^2 = E[(x-\mu)^2] = \lambda$$

Normal Distribution

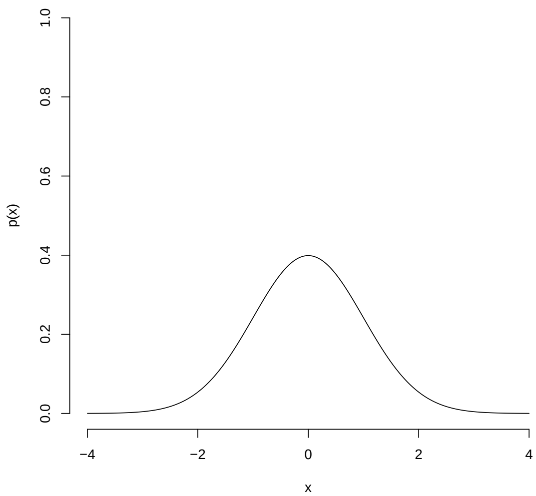

Figure 3: Normal$(0,1)$ Distribution

$$
\begin{aligned}
&X \sim \text{Normal}(\mu, \sigma^2) \\
&-\infty < x < \infty \\
&-\infty < \mu < \infty \\
&\sigma^2 > 0 \\
&p(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left[-\frac{(x-\mu)^2}{2\sigma^2}\right] \\
&\mu = E[X] = \mu \\
&\sigma^2 = E[(x-\mu)^2] = \sigma^2
\end{aligned}
$$