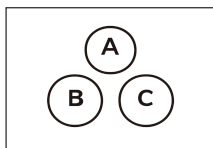


23

Discrete Distribution Negative Binomial

M



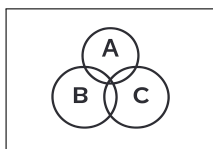
$$p = 0.5$$

$$r = 2$$

$$n = 3$$

$$P(X = n) = \binom{n-1}{r-1} p^r (1-p)^{n-r}$$

$$P(X = 3) = ?$$

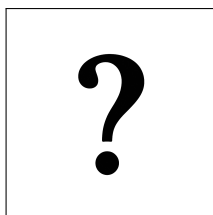


$$P(X = 3) = \binom{3-1}{2-1} (0.5)^2 (0.5)^{3-2}$$

$$P(X = 3) = \binom{2}{1} (0.5)^3$$

$$P(X = 3) = 2 \times 0.125$$

$$P(X = 3) = \boxed{0.25}$$



$$P = 0.6$$

$$r = 10$$

$$E[Y] = ?$$

$$\text{Var}(Y) = ?$$

23

Discrete Distribution
Negative Binomial

M



$$P = 0.6$$

$$r = 10$$

$$E[Y] = ?$$

$$\text{Var}(Y) = ?$$

$$E[Y] = \frac{r(1-p)}{p}$$

$$E[Y] = \frac{10(1-0.6)}{0.6}$$

$$E[Y] = \frac{10 \cdot 0.4}{0.6}$$

$$E[Y] = \frac{4}{0.6}$$

$$E[Y] = \frac{20}{3}$$

$$E[Y] \approx \boxed{6.667}$$

$$\text{Var}(Y) = \frac{r(1-p)}{p^2}$$

$$\text{Var}(Y) = \frac{10(1-0.6)}{0.6^2}$$

$$\text{Var}(Y) = \frac{10 \cdot 0.4}{0.36}$$

$$\text{Var}(Y) = \frac{4}{0.36}$$

$$\text{Var}(Y) = \frac{100}{9}$$

$$\text{Var}(Y) \approx \boxed{11.111}$$