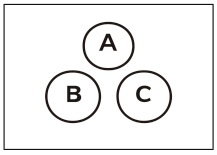
O Negative Binomial Random Variable O



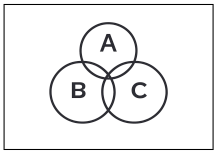
$p = 0.5$

$r = 2$

$n = 3$

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

$P(X = 3) = ?$



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

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

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

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

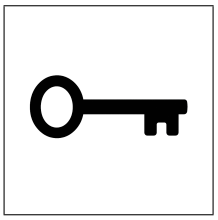
$p = 0.20$

$r = 3$

$E[X] = ?$

$Var(X) = ?$

Negative Binomial Random Variable



$p = 0.20$
$r = 3$
$E[X] = ?$
$Var(X) = ?$

$$E[X] = \frac{r}{p}$$

$$E[X] = \frac{3}{0.2}$$

$$E[X] = 15$$

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

$$\text{Var}(X) = \frac{3\,(1-0.2)}{0.2^2}$$

$$\text{Var}(X) = \frac{3 \cdot 0.8}{0.04}$$

$$\text{Var}(X) = \frac{2.4}{0.04}$$

$$\text{Var}(X) = 60$$