

Exercise 1

$$P(x=1) = 0.40$$

$$P(x=0) = 0.60$$

Expected Value ≈ mean

$$\uparrow X \sim \text{Bin}(1, 0.4)$$

$$E(x) = np = (1)(0.4)$$

$$E(x) = 0.4$$

$$\text{Var}(v) \approx np(1-p)$$

$$\text{Var}(x) = (1)(0.4) \times (1 - 0.4)$$

$$= 0.4 \times 0.6$$

$$= 0.24$$

Exercise 2

A) $P(A \cup B) = 0$ F

B) $P(A \cap B) = 0$ T

C) $P(A \cup B) = P(A \cap B)$ F

D) $P(A \cup B) = P(A) + P(B)$ T

Union

$A \cup B$

A or B

Intersection

$A \cap B$

A and B

Exercise 3

$$\text{Let } x \sim \text{Bin}(5, 0.3)$$

$$E(s) = n\bar{p}$$

$$P(x=0) + P(x=1) + P(x=2) + P(x=3) + P(x=4) + P(x=5) = 1$$

, , , , ,

$$P(x=k) = \binom{n}{k} p^k (1-p)^{n-k}$$

a) $P(x \geq 2)$

$$P(x \geq 2) = P(x=2) + P(x=3) + P(x=4) + P(x=5)$$

$$\begin{aligned} P(x \geq 2) &= (\text{SC}_2)(0.3)^2 (1-0.3)^{1(5-2)} \\ &\quad (\text{SC}_3)(0.3)^3 (1-0.3)^{1(5-3)} \\ &\quad (\text{SC}_4)(0.3)^4 (1-0.3)^{1(5-4)} \\ &\quad (\text{SC}_5)(0.3)^5 (1-0.3)^{1(5-5)} \end{aligned}$$

$$P(x \geq 2) \approx 0.472$$

b) $P(1 \leq x \leq 3)$

$$P(1 \leq x \leq 3) = P(x=1) + P(x=2) + P(x=3)$$

$$\begin{aligned} P(1 \leq x \leq 3) &= (\text{SC}_1)(0.3)^1 (1-0.3)^{(5-1)} \\ &\quad (\text{SC}_2)(0.3)^2 (1-0.3)^{(5-2)} \\ &\quad (\text{SC}_3)(0.3)^3 (1-0.3)^{(5-3)} \end{aligned}$$

$$P(1 \leq x \leq 3) = 0.969 - 0.168 = 0.801$$

c) $P(x=0)$

$$P(x=0) = (\text{SC}_0)(0.3)^0 (1-0.3)^{(5-0)}$$

$$1 \approx 1 - 0.168$$

$$P(x=0) = 0.16B$$

$$d) E(x) = n\pi$$

$$E(x) = 5.0 \cdot 3$$

$$E(x) = 1.5$$

$$\begin{aligned}e) Var(x) &= n \cdot \pi_x \cdot (1 - \pi_x) \\&= 5 \times 0.3 \cdot (1 - 0.3) \\&= 1.5 \times 0.7 \\&= 1.05\end{aligned}$$