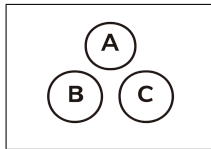
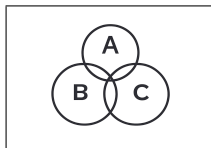


# O Poisson Random Variable O

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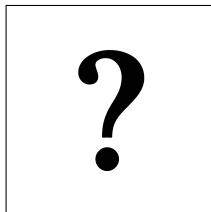


$$\lambda = 1$$



$$P(X = k) = e^{-\lambda} \frac{\lambda^k}{k!}$$

$$P(X = 0) = e^{-1} \frac{1^0}{0!} = e^{-1} \approx \boxed{0.37}$$



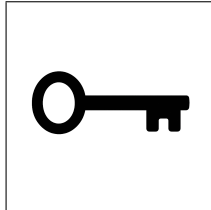
$$n = 200$$

$$p = 0.0025$$

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

# O Poisson Random Variable O

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$$\begin{aligned}n &= 200 \\p &= 0.0025 \\P(X \geq 3) &= ?\end{aligned}$$

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$$\lambda = np = 200 \times 0.0025 = 0.5$$

$$X \approx \text{Pois}(0.5)$$

$$P(X \geq 3) = 1 - [P(0) + P(1) + P(2)]$$

$$P(X \geq 3) = 1 - e^{-0.5} \left( 1 + 0.5 + \frac{0.5^2}{2!} \right)$$

$$P(X \geq 3) = 1 - e^{-0.5} (1 + 0.5 + 0.125)$$

$$P(X \geq 3) = 1 - 1.625 e^{-0.5}$$

$$P(X \geq 3) \approx 1 - 1.625 \times 0.60653 \approx 1 - 0.9856 = \boxed{0.0144}$$