Expectation of Poisson distribution

$$E(X) = \sum_{x \in \text{Im}(X)} x \Pr(X = x)$$

$$E(X) = \sum_{k \geq 0} k \frac{1}{k!} \lambda^k e^{-\lambda}$$

$$E(X) = \lambda$$

Variance of Poisson distribution

$$\text{var}(X) = E(X^2) - (E(X))^2$$

$$E(X^2) = \sum_{k \geq 0} k^2 \frac{1}{k!} \lambda^k e^{-\lambda}$$

$$\text{var}(X) = \lambda$$