No.

Date

Let X be a random variable that follows Poisson distribution π_k.

Mean and Variance of Poisson distribution.

$$\pi_k = \frac{1}{k!} \lambda^k e^{-\lambda} \qquad \lambda > 0$$

$$k = 0, 1, 2, \ldots$$

- Mean

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

$$= \lambda \sum_{k=1}^{\infty} \frac{1}{(k-1)!} \lambda^{k-1} e^{-\lambda} \qquad k' = k-1$$

$$= e^{-\lambda} \lambda \sum_{k'=0}^{\infty} \frac{1}{k'!} \lambda^{k'}$$

$$= \lambda e^{-\lambda} e^{\lambda}$$

$$= \lambda$$

- Variance

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

$$= \lambda \sum_{k=1}^{\infty} k \frac{1}{(k-1)!} \lambda^{k-1} e^{-\lambda} \qquad k' = k-1$$

$$= \lambda e^{-\lambda} \left[\sum_{k'=0}^{\infty} (k'+1) \frac{1}{k'!} \lambda^{k'} \right]$$

$$= \lambda e^{-\lambda} \left[\sum_{k'=0}^{\infty} \frac{1}{k'!} \lambda^{k'} + \sum_{k'=1}^{\infty} \frac{1}{(k'-1)!} \lambda^{k'} \right]$$

$$= \lambda e^{-\lambda} \left[e^{\lambda} + \lambda e^{\lambda} \right]$$

$$= \lambda(1+\lambda)$$

$$\mathrm{Var}(X) = \mathbb{E}(X^2) - \mathbb{E}(X)^2$$

$$= \lambda + \lambda^2 - \lambda^2$$

$$= \lambda$$

$$\Rightarrow \mathrm{Var}(X) = \mathbb{E}(X)$$