The variance of Bernoulli random variable is π(1-π) where π is the probability of a successful Bernoulli trial (i.e. probability that x = 1). Using the formula for the probability function (p.f.) of a Bernoulli random variable, and the formula for variance, prove that V(X) = π(1-π).

Solution

From the definition of variance:

$$V(X) = E\left(\left(X - E(X)\right)^2\right)$$

From the Expectation of Bernoulli Distribution, we have $E(X) = \pi$.

Then by definition of Bernoulli distribution:

$$V(X) = E\left(\left(X - E(X)\right)^2\right) = (1-\pi)^2 * \pi + (0-\pi)^2 * (1-\pi)$$
$$= \pi - 2\pi^2 + \pi^3 + \pi^2 - \pi^3 = \pi - \pi^2 = \pi(1-\pi)$$

Answer: V(X) = π(1-π).