UKRIDA
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Pusat MEDIA Pembelajaran UKRIDA

Ekspektasi Matematis

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Being Transformed To Win The Future

Expected Value

Let X be a random variable with probability distribution $f(x)$. The **mean**, or **expected value**, of X is

$$\mu = E(X) = \sum_{x} x f(x)$$

if X is discrete, and

$$\mu = E(X) = \int_{-\infty}^{\infty} x f(x)\, dx$$

if X is continuous.

Soal Latihan 1

Sebuah koin dilempar dua kali berturut-turut. Bila hasil yang keluar keduanya muka, maka mendapat Rp. 1000. Bila hasil yang keluar satu muka dan satu belakang maka mendapat uang Rp. 500. Sedangkan bila hasil yang keluar keduanya belakang, maka mesti membayar Rp. 1500. Tentukan nilai ekspektasi matematika, dan beri maknanya.

Soal Latihan 2

Let X be the random variable that denotes the life in hours of a certain electronic device. The probability density function is

$$f(x) = \begin{cases} \frac{20{,}000}{x^3}, & x > 100, \\ 0, & \text{elsewhere.} \end{cases}$$

Find the expected life of this type of device.

Variance Random Variable

Let X be a random variable with probability distribution $f(x)$ and mean μ. The variance of X is

$$\sigma^2 = E[(X-\mu)^2] = \sum_x (x-\mu)^2 f(x), \qquad \text{if } X \text{ is discrete, and}$$

$$\sigma^2 = E[(X-\mu)^2] = \int_{-\infty}^{\infty} (x-\mu)^2 f(x)\, dx, \qquad \text{if } X \text{ is continuous.}$$

The positive square root of the variance, σ, is called the **standard deviation** of X.

Soal Latihan 3

Let the random variable X represent the number of defective parts for a machine when 3 parts are sampled from a production line and tested. The following is the probability distribution of X.

x	0	1	2	3
$f(x)$	0.51	0.38	0.10	0.01

Find the mean and variance of X.

Soal Latihan 4

The weekly demand for a drinking-water product, in thousands of liters, from a local chain of efficiency stores is a continuous random variable X having the probability density

$$f(x) = \begin{cases} 2(x-1), & 1 < x < 2, \\ 0, & \text{elsewhere.} \end{cases}$$

Find the mean and variance of X.

SEKIAN