

Uniform Distribution

Introduction

- A random variable X has a uniform distribution on the interval from a to b if its density on that interval is constant.
- The probability density function of a uniform distribution is given by

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

The mean μ , the variance σ^2 and the standard deviation σ of the uniform distribution, are given respectively by

$$\mu = \int_a^b x \frac{1}{b-a} dx = \frac{a+b}{2}$$

$$\sigma^2 = \int_a^b (x - \mu)^2 \frac{1}{b-a} dx = \frac{1}{12} (b-a)^2$$

$$\sigma = \frac{b-a}{2\sqrt{3}}$$

Example 4.5

In a certain experiment, the error made in determining the density of a substance is a random variable having a uniform density with $a=-0.015$ and $b=0.015$. Find the probability that such errors will be between -0.002 and 0.003