

3E The Continuous Uniform Distribution

A continuous uniform distribution over the interval $[a, b]$ has p.d.f.

$$f(x) =$$

Notation:

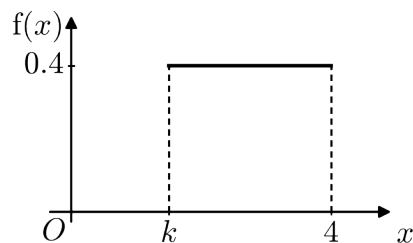
Sketch of the p.d.f.:

1. The continuous random variable X is uniformly distributed on $[3, 5]$. Find:

a) $P(3.2 < X < 4.3)$

b) k such that $P(2X < k - X) = 0.2$.

2. The continuous random variable X has p.d.f. as shown in the diagram.



Find:

- a) the value of k

b) $P(3 < X < 3.5)$

c) $P(X > 3 \mid X > 2)$

3. The continuous random variable X has probability density function

$$f(x) = \begin{cases} \frac{1}{5} & 3 \leq x \leq 8 \\ 0 & \text{otherwise} \end{cases}$$

a) Write down the name of this distribution.

The continuous random variable $Y = 12 - 3X$. Find:

b) $E(Y)$

c) $P(Y > 0)$

d) $P(X < 7 \mid Y < 0)$

4. The continuous random variable X has probability density function

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

Find:

a) $E(X)$

b) $\text{Var}(X)$

c) $F(x)$

For a continuous uniform distribution $U[a, b]$:

$E(X) =$ $\text{Var}(X) =$

$F(x) =$

5. The continuous random variable X is uniformly distributed over the interval $[4, 7]$. Find:
- a) $E(X)$
 - b) $\text{Var}(X)$
 - c) the cumulative distribution function of X , for all x .
6. The continuous random variable Y is uniformly distributed over the interval $[a, b]$. Given that $E(Y) = 1$ and $\text{Var}(Y) = 16/3$, find the value of a and the value of b .
7. The continuous random variable X is uniformly distributed over the interval $[-3, 5]$.
- a) Write down $E(X)$.
 - b) Use integration to find the variance of X .