Mean, variance and standard deviation for continuous models

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. For density $3x^2$ on [0,1], find E(X). [2 marks]

$\int_0^1 3x^3\,dx = 3/4$.

Answer: 3/4.

2. For density $3x^2$ on [0,1], find E(X squared) and variance. [3 marks]

$\int_0^1 3x^4\,dx = 3/5$.

$3/5 - (3/4)^2 = 3/80$.

Answer: 3/5 and 3/80.

3. Find the mean and variance of a uniform variable on [0,6]. [2 marks]

Use the midpoint and $6^2/12 = 3$.

Answer: Mean 3; variance 3.

4. For E(X)=2/3 and Var(X)=1/18, find the mean and variance of $5 - 2X$. [2 marks]

$5 - 2(2/3) = 11/3$; $(-2)^2/18 = 2/9$.

Answer: 11/3 and 2/9.

5. A length has variance 0.04 square metres. Find its standard deviation. [2 marks]

Take the positive square root and use the original unit.

Answer: 0.2 m.

6. For density 1/2 on [-1,1], find mean and variance. [3 marks]

Symmetry gives mean zero.

$E(X^2) = \frac{1}{2}\int_{-1}^{1} x^2\,dx = 1/3$.

Answer: 0 and 1/3.