

Question (1967 STEP III Q11)

Let X be a random variable uniformly (rectangularly) distributed over the interval $0 < x < 1$. Derive the probability density functions of the following random variables (a) $Y = X^2 - 1$, (b) $Z = \sin \pi X$. Find the mean and standard deviation of Y and Z .

Question (1962 STEP III Q309)

Two numbers x and y are chosen at random between 0 and 2. Find the chance that $x^m y^n \leq 1$ in the three cases:

- (i) $m = n = 1$;
- (ii) $m = 2, n = 1$;
- (iii) $m = 2, n = -1$.