Poisson Q1 (20/2/24)

Each week Isaac buys a lottery ticket, where the prize £X has a Poisson distribution with mean 1.

What is the probability that his average win over 10 weeks is more than £1?

Solution

Let $Y = X_1 + X_2 + \cdots + X_{10}$, where each $X_i \sim Po(1)$.

Then required probability is

$P\left(\frac{Y}{10} > 1\right) = P(Y > 10)$

where $Y \sim Po(10)$

$= 1 - P(Y \leq 10)$,

$= 1 - 0.58304 = 0.41696$ or 0.417 (3sf)