

Problem Set 5

1. Let $p(n)$ denote the number of partitions of n . For example, $p(4) = 5$ since $4 = 3 + 1 = 2 + 2 = 2 + 1 + 1 = 1 + 1 + 1 + 1$. Write a program which determines $p(n)$ for a given n and test it on $n = 100$.
2. A dart, thrown at random, hits a square target in a uniform way. Find the probability that the point hit is nearer to the center than to any edge.
3. Find the probability that three random points in a square form an acute triangle.
4. Suppose a type of glass is such that:
 - (a) 70% of light shining from one side is transmitted through to the other.
 - (b) 20% of the light is reflected.
 - (c) The remaining 10% is absorbed in the glass.

How much of an original light source will be transmitted through 3 panes of glass?

5. Let $x_1 = 1$ and for $m \geq 1$ let

$$x_{m+1} = \frac{1}{m + 3/2} \sum_{k=1}^m x_k x_{m+1-k}.$$

Evaluate

$$\lim_{m \rightarrow \infty} \frac{x_m}{x_{m+1}}.$$