

# AI1103 : Challenging Problem 7

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Download all python codes from

[https://github.com/Santosh-Dhaladhuli2003/AI1103/blob/main/Challenging%20Problem%207/challenging\\_problem.py](https://github.com/Santosh-Dhaladhuli2003/AI1103/blob/main/Challenging%20Problem%207/challenging_problem.py)

and the latex codes from

<https://github.com/Santosh-Dhaladhuli2003/AI1103/blob/main/Challenging%20Problem%207/Challenging%20Problem.tex>

## 1 IES/ISS EXAM STATISTICS 2015 Q.3(c)

Two Points are chosen on a line of unit length. Find the probability that each of the 3 line segments will have length greater than  $\frac{1}{4}$ ?

## 2 SOLUTION

Let the line segment be named as AB, and the points chosen be P and Q.

if  $AP = x$ ,  $PQ = y$

$$QB = 1 - x - y \quad (2.0.1)$$

given,

$$x > \frac{1}{4}, y > \frac{1}{4}, \text{ and } 1 - x - y > \frac{1}{4} \quad (2.0.2)$$

$$\Rightarrow x > \frac{1}{4}, y > \frac{1}{4}, \text{ and } x + y < \frac{3}{4} \quad (2.0.3)$$

Favourable region for this in cartesian coordinate system is,

$$\text{Area of favorable region is} = \frac{1}{2} \times \frac{1}{4} \times \frac{1}{4} = \frac{1}{32} \quad (2.0.4)$$

Sample space of the event is,

$$x > 0, y > 0, \text{ and } x + y < 1 \quad (2.0.5)$$

Sample space in cartesian coordinate system is,

$$\text{Area of the Sample Space is} = \frac{1}{2} \times 1 \times 1 = \frac{1}{2} \quad (2.0.6)$$

Fig. 0: Favourable region

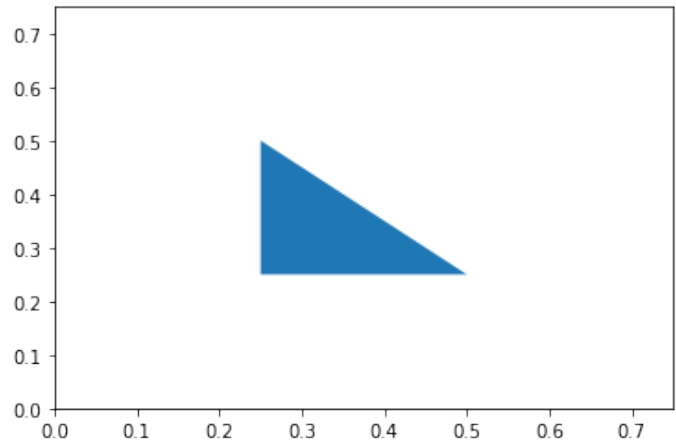
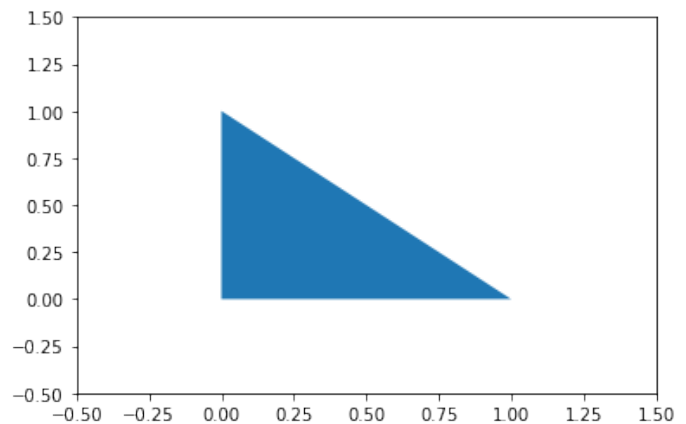


Fig. 0: Sample Space



$$\begin{aligned} \text{Required Probability} &= \frac{\text{Area of favorable region}}{\text{Area of Sample Space}} \\ &= \frac{\frac{1}{32}}{\frac{1}{2}} \\ &= \frac{1}{16} \end{aligned}$$

**Final Answer is  $\frac{1}{16}$**