# Challenging problems

Annu-EE21RESCH01010

**Download latex code from here-**

https://github.com/annu100/AI5002−Probability−and−Random−variables/tree/main.tex/challenging problems

## I. Challenging problem 9

Two points are chosen on a line of unit length.Find probability that each of 3 line segements have length greater than 1/4 is.....

## II. SOLUTIONS

Imagine choosing one point P1, and then a second point P2. We assume that ”at random” means here that the distributions of P1 and P2 are uniform on [0,1] and that P1 and P2 are independent.
We want the probability that 1/4 ≥ P1 ≤ 3/4 and 1/4 ≥ P2 ≤ 3/4 and subtraction of P1 and P2 ≥ 1/4.
Draw the usual square. Draw the line x=$\frac{1}{4}$, x=$\frac{3}{4}$, y=$\frac{1}{4}$, y=$\frac{3}{4}$. By Looking at the K square bounded by these lines.
Drawing the two lines subtraction of P1 and P2 is ± 1/4.
We want to find the probability that (P1,P2). lands in the part of K that is not between these two lines. That consists of two isosceles right-angled triangles.
Each of these triangles has legs 16, so their combined area is

$$\frac{1}{16}$$

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