

# Assignment-3

S. Rithvik Reddy - cs20btech11049

Download all python codes from

<https://github.com/rithvikreddy6300/Assignment-3/tree/main/codes>

and latex-tikz codes from

<https://github.com/rithvikreddy6300/Assignment-3/blob/main/Assignment-3.tex>

So the probability is  $\frac{1}{625}$ , option (A).

The comparison of probability obtained by calculation and simulation is as follows (Fig-0).

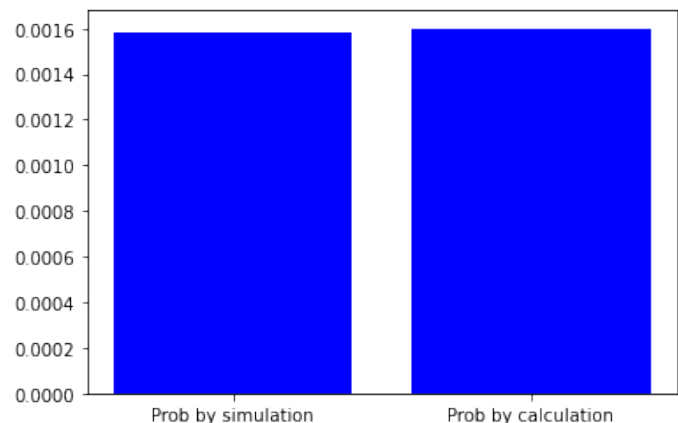


Fig. 0: a nice plot

PROBLEM-(GATE 2010 (CS) Q-27)

What is the probability that a divisor of  $10^{99}$  is a multiple of  $10^{96}$  ?

- (A)  $\frac{1}{625}$       (B)  $\frac{4}{625}$       (C)  $\frac{12}{625}$       (D)  $\frac{16}{625}$

SOLUTION

Let

$$X = \{(x, y) : 0 \leq x \leq 99, 0 \leq y \leq 99\}$$

be a set of random variables,  $N = 2^x 5^y$ ,

$$\Rightarrow \forall (x, y) \in X, N \text{ is a divisor of } 10^{99} \quad (0.0.1)$$

$$\Rightarrow n(X) = 100 * 100 = 10^4 \quad (0.0.2)$$

Let

$$Y = \{(x, y) : (x, y) \in X, x \geq 96, y \geq 96\}$$

$$n = 2^x 5^y$$

$$\Rightarrow \forall (x, y) \in Y, n \text{ is multiple of } 10^{96}, \text{ divides } 10^{99} \quad (0.0.3)$$

$$\Rightarrow n(Y) = 4 * 4 = 16 \quad (0.0.4)$$

Let P denotes the probability that a divisor of  $10^{99}$  is a multiple of  $10^{96}$  then

$$P = \frac{n(Y)}{n(X)}$$

From (0.0.2) and (0.0.4) we can write

$$P = \frac{16}{10^4} = \frac{1}{625}$$