

Assignment 4

SAVARANA DATTA - AI20BTECH11008

Download all python codes from

<https://github.com/SavaranaDatta/AI1103/blob/main/Assignment4/codes/Assignment4.py>

and latex-tikz codes from

<https://github.com/SavaranaDatta/AI1103/blob/main/Assignment4/Assignment4.tex>

1 PROBLEM(CS 2010 Q.26)

Consider a company that assembles computers. The probability of a faulty assembly of any computer is p . The company therefore subjects each computer to testing process. This testing process gives the correct result for any computer with a probability of q . What is the probability of a computer being declared faulty?

- (A) $pq + (1-p)(1-q)$
- (B) $(1-q)p$
- (C) $(1-p)q$
- (D) pq

2 SOLUTION(CS 2010 Q.26)

Let $X_i \in \{0, 1\}$ where $\Pr(X_1 = 1)$ represents the computer is faulty before testing, $\Pr(X_2 = 1)$ represents the testing process gives the correct result.

TABLE 4

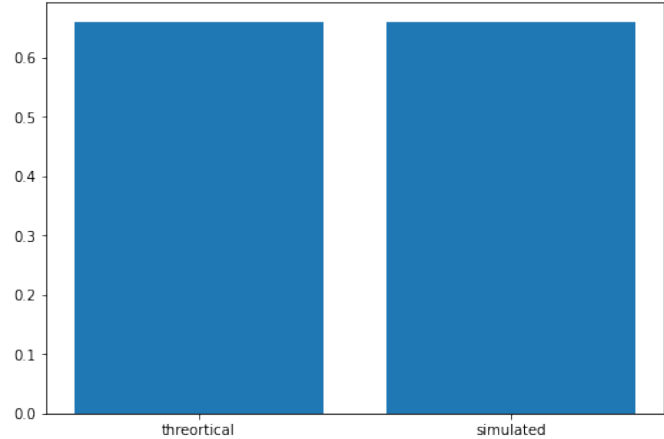
	$X_1 = 0$	$X_1 = 1$
$X_2 = 0$	$(1-p)(1-q)$	$(1-q)p$
$X_2 = 1$	$(1-p)q$	pq

Table 4 represents the probabilities of all possible cases. The probability of a computer being declared as faulty is

$$= \Pr((X_2 = 1)(X_1 = 1)) + \Pr((X_2 = 0)(X_1 = 0)) \quad (1.1)$$

$$= pq + (1-p)(1-q) \quad (1.2)$$

The required option is (A).



The above plot is drawn for $p = 0.2724825, q = 0.68752064$