AI1103 - Assignment - 1

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Download all python codes from

https://github.com/VamsiPreetham−21/AI1103−Assignment−−−1/blog/main/Assignment1.py

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Question - 5.5

If each element of a second order determinant is either zero or one , what is the probability that the value of the determinant is positive ? (Assume that the individual entries are chosen independently each value being assumed with probability 1/2)

Solution :

Total number of entries in the matrix are 4.
Let X = 0,1 be a random variable denoting the possible value for each entry.

$$\Pr(X = 0) = \frac{1}{2} \tag{1}$$

$$\Pr(X = 1) = \frac{1}{2} \tag{2}$$

For the determinant of the matrix to be positive first and fourth entries should be 1 and at least one among the other two should be zero

$$\begin{aligned} &= \Pr(X = 1)\Pr(X = 1)(1 - (\Pr(X = 1)\Pr(X = 1))) \\ &= \frac{1}{4}(1 - \frac{1}{4}) \\ &= \frac{3}{16} \end{aligned} \tag{3}$$