

# Assignment 1

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Download all python codes from

<https://github.com/Gautham-Bellamkonda/AI1103/Assignment1/Codes>

and latex codes from

<https://github.com/Gautham-Bellamkonda/AI1103/Assignment1>

## PROBLEM

(Prob 2.3) Assume that the chances of a patient having a heart attack is 40%. It is also assumed that a meditation and yoga course reduces the risk of heart attack by 30% and prescription of certain drug reduces its chances by 25%. At a time a patient can choose any one of the two options with equal probabilities. It is given that after going through one of the two options the patient selected at random suffers a heart attack. Find the probability that the patient followed a course of meditation and yoga?

## SOLUTION

Let  $H$  denote the chances of the patient having a heart attack,  $Y$  denote that the patient takes a meditation and yoga course, and  $D$  denote that the patient takes the drug.

Given that,

$$\begin{aligned}\Pr(H) &= 0.4 \\ \Pr(Y) &= \Pr(D) \\ \Pr(H|Y) &= \Pr(H)(1 - 0.30) \\ &= 0.28 \\ \Pr(H|D) &= \Pr(H)(1 - 0.25) \\ &= 0.3\end{aligned}$$

Therefore, by Bayes' Theorem

$$\Pr(Y|H) = \frac{\Pr(H|Y) \Pr(Y)}{\Pr(H|Y) \Pr(Y) + \Pr(H|D) \Pr(D)}$$

We can cancel  $\Pr(D)$  and  $\Pr(Y)$  from the numerator and denominator as they are given to be equal.

$$\begin{aligned}\therefore \Pr(Y|H) &= \frac{\Pr(H|Y)}{\Pr(H|Y) + \Pr(H|D)} \\ &= \frac{0.28}{0.28 + 0.3} \\ &= \frac{0.28}{0.58} \\ &= \frac{14}{29} \\ &\approx 0.48275862069\end{aligned}$$

Therefore, the probability that the patient followed a course of meditation and yoga, given that he suffers a heart attack is 0.48275862069