Solution of Assignment 6

You ask your neighbor to water a sickly plant while you are on vacation. Without water it will die with probability 0.8, with water it will die with probability 0.15. You are 90 percent certain that your neighbor will remember to water the plant.

(a) What is the probability that the plant will be alive when you return?

(b) If it is dead, what is the probability your neighbor forgot to water it?

Let W is the event that the plant were watered & D is the event that the plant died.

We want

(a) $P(D^c)$ and (b) $P(W^c \mid D)$

It's given to us that : $P(D|W^c) = 0.8$

$P(D|W) = 0.15$ & $P(W) = 90/100$ $\Rightarrow P(W^c) = 1 - \frac{90}{100}$

$\Rightarrow P(W^c) = \frac{10}{100}$

We know that

$P(D^c) = 1 - P(D)$ —— (i)

Let's now find $P(D)$. By Law of Total Probability

$$P(D) = P(D|W)P(W) + P(D|W^c)P(W^c)$$

$$\Rightarrow P(D) = (0.15)\left(\frac{90}{100}\right) + (0.8)\left(\frac{10}{100}\right)$$

$\Rightarrow P(D) = 0.215$. Substituting values in (i) we get

$P(D^c) = 1 - 0.215 \Rightarrow \boxed{P(D^c) = 0.785}$ Ans

(b) $$P(W^c|D) = \frac{P(D|W^c)\,P(W^c)}{P(D)}$$ [By Baye's Rule]

$$= \frac{(0.8)(10/100)}{0.215}$$

$$\Rightarrow \boxed{P(W^c|D) = 0.372}$$ Ans