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Subgroup 5

Probability and Statistics – Assignment 1

You ask your neighbour to water a secret plant while you're on holiday. There is an 80% chance of the plant dying without it being watered and a 15% chance of it dying if it's watered.

You're 90% certain that the neighbour will remember to water the plant.

a) Compute the probability of the plant being alive when you return.

b) Compute the probability of the plant not being watered if you return home to a dead plant.

A: The plant is alive given the neighbour watered

B: The plant is alive given the neighbour did not water it

C: The plant is alive when you return

$P(A) = 1 – 0.15 = 0.85$

$P(B) = 1 – 0.80 = 0.20$

By the law of total probability:

$P(C) = P(C|A) * P(A) + P(C|B) * P(B) \Rightarrow P(C) = 0.85* 0.90 + 0.20 * 0.10 = 0.785$

b) We want to figure out the probability that the plant wasn't watered given that it died.

A: The plant was watered

B: The plant was not watered

C: The plant died

Using Bayes theorem we calculate $P(B|C)$

$P(B|C) = P(C|B) * P(B) / P(C)$

$P(C|B) = 0.80$ (as given in the problem)

$P(B) = 1- P(A) = 1- 0.90 = 0.10$

$P(C) = P(C|A) * P(A) + P(C|B) * P(B) \Rightarrow P(C) = 0.15 * 0.90 + 0.80 * 0.10 = 0.215$

$P(B|C) = (0.80 * 0.10)/0.215 = 0.372$

Extra from lab 4: