Baye's Theorem - 2

You are requested to take care of some plants by your neighbour who is on vacation.
If you forget to water the plants, they will die with a probability of 0.8;
if you do water the plants, they will die with a probability 0.15.

You are 90 percent certain that you will remember to water the plant.

a) What is the probability that the plant will be alive when your neighbour returns?
b) If the plants are dead when your neighbour checks, what is the probability you forgot to water it?

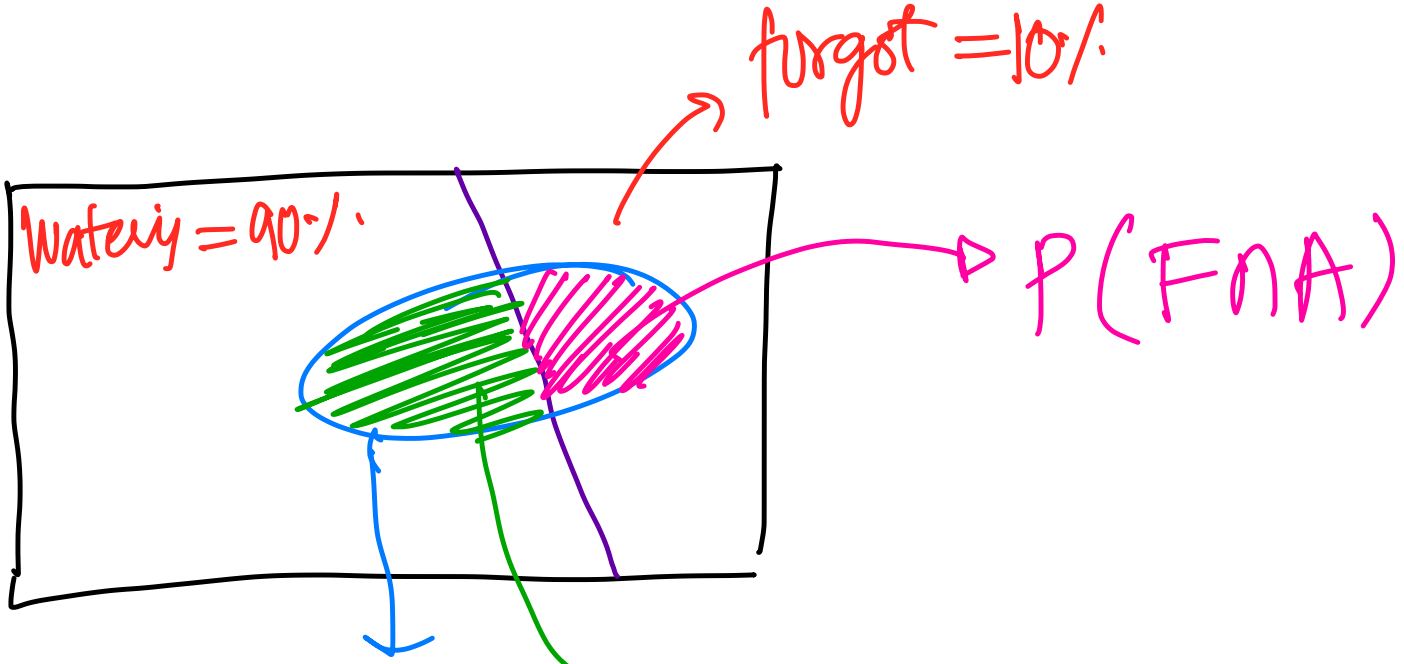
$P(A) = ?$ Total prob. of being alive

Soln.

Marginal | Conditional | Joint

watering $P(W) = 0.90$
- alive (A) → $0.85 = P(A|W)$ → $P(W \cap A)$
- dead (D) → $0.15 = P(D|W)$ → $P(W \cap D)$

Forgot $P(F) = 0.10$
- alive (A) → $0.20 = P(A|F)$ → $P(F \cap A)$
- dead (D) → $0.80 = P(D|F)$ → $P(F \cap D)$



$$P(A) = P(F \cap A) + P(W \cap A)$$

total Alive Prob.

$$P(A) = P(F) \cdot P(A|F) + P(W) \cdot P(A|W)$$

$P(A) = 0.785 \approx 78.5\%$ chances.

that neighbour would find that their plants are alive.

(ii) $P(F \mid D) = \dfrac{P(F \cap D)}{P(D)}$

$= \dfrac{P(F) \cdot P(D|F)}{P(F) \cdot P(D|F) + P(W) \cdot P(D|W)}$

$= \dfrac{0.1 \times 0.8}{(0.1 \times 0.8) + (0.9 \times 0.15)} \approx 37\%$