

Assignment 3 Solution

1.

I	II	III
2W	2W	1W
2B	1B	3B

a.

$$\frac{2}{4} \times \frac{2}{3} \times \frac{1}{4} = \frac{1}{12}$$

b.

$$P(W) = \frac{1}{3} \times \frac{2}{4} + \frac{1}{3} \times \frac{2}{3} + \frac{1}{3} \times \frac{1}{4} = \frac{17}{36}$$

c.

$$P(I|W) = \frac{P(I \cap W)}{P(W)} = \frac{\frac{1}{3} \times \frac{2}{4}}{\frac{17}{36}} = \frac{7}{16}$$

2.

Let M = event consumer is a man

Let W = event consumer is a woman

Let B = event preferred plain bottled water

Let S = event preferred sports drink

a. $P(B) = 280/400 = .70$

b. Sports drink: $80 + 40 = 120$

$$P(S) = 120/400 = .30$$

c. $P(M|S) = 80/120 = .67$

$$P(W|S) = 40/120 = .33$$

d. $P(S)P(M|S) = .30(.67) = .20$

$$P(S)P(W|S) = .30(.33) = .10$$

e. $P(M) = .50$

$$P(S|M) = \frac{P(M \cap S)}{P(M)} = \frac{.20}{.50} = .40$$

f. $P(W) = .50$

$$P(S|W) = \frac{P(W \cap S)}{P(W)} = \frac{.10}{.50} = .20$$

g. No;

$$P(S|M) \neq P(S)$$

$$P(S|W) \neq P(S)$$

3.

Assume T is the event of passing the test, and E is the event of satisfactory

Then

a.

$$P(E) = P(T)P(E|T) + P(T^c)P(E|T^c)$$

$$= 0.3 \times 0.8 + 0.7 \times 0.1 = 0.31$$

b.

$$P(T|E) = \frac{0.3 \times 0.8}{0.3 \times 0.8 + 0.7 \times 0.1} = 0.7742$$

4.

假設國中前談過戀愛的機率為 P , 拿 A 卷的事件為 A , 拿 B 卷的事件為 B , 畫圈的事件為 O , 則

$$P(O) = P(A)P(O|A) + P(B)P(O|B)$$

$$\frac{25}{60} = \frac{40}{60} \times P + \frac{20}{60} \times (1 - p)$$

$$\therefore p = 0.25$$

5.

M = missed payment

D_1 = customer defaults

D_2 = customer does not default

$$P(D_1) = .05 \quad P(D_2) = .95 \quad P(M | D_2) = .2 \quad P(M | D_1) = 1$$

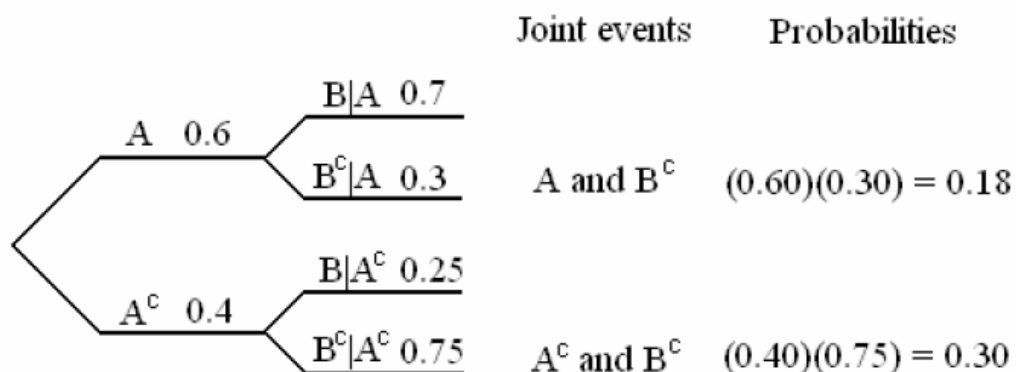
$$a. \quad P(D_1 | M) = \frac{P(D_1)P(M|D_1)}{P(D_1)P(M|D_1) + P(D_2)P(M|D_2)} = \frac{(.05)(1)}{(.05)(1) + (.95)(.2)} = \frac{.05}{.24} = .21$$

b. Yes, the probability of default is greater than .20.

6.

Define events: A =win series, B =win first game

$$P(A) = .60, P(B | A) = .70, P(B | A^c) = .25$$



$$P(B^c) = .18 + .30 = .48$$

$$P(A | B^c) = \frac{P(A \text{ and } B^c)}{P(B^c)} = \frac{.18}{.48} = .375$$

7.

(1) $0.6 \cdot 0.4$

(2) $0.12 \cdot 0.48$

(3) $0.68 \cdot 0.92$

8.

Order 7 desktops.