

Announcements

- HW2 Due Tonight 11:59 PM on Icon.

- HW1 Missed Problems Due Tonight 11:59 PM by email / Icon

- Exam 1 Wed Feb 11th

6:30 - 8:30 PM Location TBD

1 Crib Sheet Allowed

- Quiz 2 Today Last 20 minutes

Show Work on quizzes

Prob 1)

Sally Sells Seashells and
Lemonade. The probability

a tourist buys a seashell

is 40%, the probability

they buy lemonade is 20%,

and prob they buy either

is 50%

(a) What % of customers
buy both Seashells & Lemonade?

(ans) $P(S) = 0.4$, $P(L) = 0.2$

$$P(S \cup L) = 0.5$$

$$P(S \cap L) = ?$$

Using formula

$$\begin{aligned} P(S \cap L) &= P(S) + P(L) - P(S \cup L) \\ &= 0.4 + 0.2 - 0.5 \\ &= 0.1 \end{aligned}$$

(b) What percent buy only a seashell?

(ans)

$$\begin{aligned} P(S \cap L^c) &= P(S) - P(S \cap L) \\ &= 0.5 - 0.1 \\ &= 0.4 \end{aligned}$$

2)

Steve flips a water bottle 8 times independently. The probability of a successful flip is 70%.

What is probability at least one water bottle flip lands successfully?

(ans) 1

$$P(f) = 0.7,$$

$$P(f^c) = 1 - P(f) = 1 - 0.7 = 0.3$$

$$\begin{aligned} P(\text{At least one}) &= 1 - P(\text{none}) \\ &= 1 - [P(f^c)]^8 \\ &= 1 - (0.3)^8 \end{aligned}$$

3) A dog daycare center has 70% Golden Retrievers and 30% Labradors.

80% of Golden Retrievers like walks while only 50% of Labradors like walks.

If a random dog is selected that likes walks, what is the probability that it's a Golden Retriever?

(ans)

$$P(GR) = 0.7, \quad P(GR^c) = 0.3$$

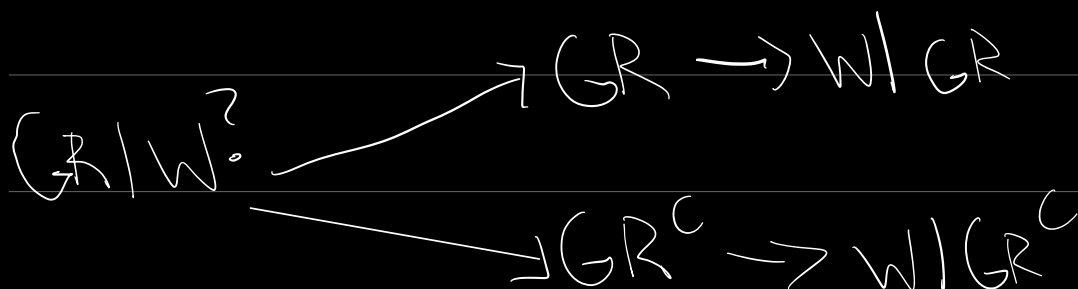
$$P(W|GR) = 0.8, \quad P(W|GR^c) = 0.5$$

$$P(GR|W) = ?$$

Bayes Theorem:

$$\begin{aligned}
 P(GR|W) &= \frac{P(W|GR)P(GR)}{P(W|GR)P(GR) + P(W|GR^c)P(GR^c)} \\
 &= \frac{(0.8)(0.7)}{(0.8)(0.7) + (0.5)(0.3)} \\
 &= \frac{0.56}{0.56 + 0.15} \\
 &= \frac{0.56}{0.71}
 \end{aligned}$$

Alternatively



$$\frac{(0.7)(0.8)}{(0.3)(0.5) + (0.7)(0.8)}$$

4) 30% people hate coffee. 70% like it, 85% of coffee haters like apples while

60% coffee drinkers like apples. Given someone likes apples what is probability they hate coffee?

(ans)

$$P(H) = 0.3$$

$$P(H^c) = 0.7$$

$$P(a|H) = 0.85$$

$$P(a|H^c) = 0.6$$

$$P(H|a) = ?$$

$$\frac{P(a|H)P(H)}{P(H)}$$

$$P(H|a) = \frac{P(a|H)P(H) + P(a|H^c)P(H^c)}{P(H)}$$

$$\rightarrow H \rightarrow a|H$$

$$\rightarrow H^c \rightarrow a|H^c$$

$$= \frac{(0.3)(0.85)}{(0.7)(0.6)}$$

$$= \frac{0.255}{0.42}$$

$$\approx 0.607$$