

# *DSE\_HW4\_Day4*

## *Worksheet 8*

1

$$\begin{aligned}P_r(\text{six heads}) &= P_r(\text{six heads, bad coin}) + P_r(\text{six heads, no bad coin}) \\&= P_r(\text{bad coin})P_r(\text{six heads}|\text{bad coin}) + \\&P_r(\text{no bad coin})P_r(\text{six heads}|\text{no bad coin}) \\&= \frac{1}{65} \cdot 1 + \frac{64}{65} \cdot \left(\frac{1}{2}\right)^6 \\&= \frac{2}{65}\end{aligned}$$

$$\begin{aligned}P_r(\text{bad coin}|\text{six heads}) &= P_r(\text{bad coin}) \times \frac{P_r(\text{six heads}|\text{bad coin})}{P_r(\text{six heads})} \\&= \frac{1}{65} \times \frac{1}{\frac{2}{65}} \\&= \frac{1}{2}\end{aligned}$$

**Answer :**

$$\frac{1}{2}$$

2

$$P_r(tiger) = \frac{1}{3}$$

$$P_r(mammoth) = \frac{2}{3}$$

$$P_r(positive|tiger) = \frac{5}{6}$$

$$P_r(negative|tiger) = \frac{1}{6}$$

$$P_r(positive|mammoth) = \frac{1}{3}$$

$$P_r(negative|mammoth) = \frac{2}{3}$$

$$P_r(negative) = P_r(negative, tigar) + P_r(negative, mammoth)$$

$$= P_r(tigar)P_r(negative|tigar) +$$

$$P_r(mammoth)P_r(negative|mammoth)$$

$$= \frac{1}{3} \times \frac{1}{6} + \frac{2}{3} \times \frac{2}{3}$$

$$= \frac{1}{2}$$

$$P_r(tigar|negative) = P_r(tigar) \times \frac{P_r(negative|tigar)}{P_r(negative)}$$

$$= \frac{1}{3} \times \frac{\frac{1}{6}}{\frac{1}{2}}$$

$$= \frac{1}{9}$$

**Answer :**

$$\frac{1}{9}$$

3

$$P_r(dog) = \frac{3}{4}$$

$$P_r(bear) = \frac{1}{4}$$

$$P_r(scratch|dog) = \frac{1}{10}$$

$$P_r(scratch|bear) = \frac{3}{5}$$

$$P_r(scratch) = P_r(scratch, dog) + P_r(scratch, bear)$$

$$= P_r(dog)P_r(scratch|dog) +$$

$$P_r(bear)P_r(scratch|bear)$$

$$= \frac{3}{4} \times \frac{1}{10} + \frac{1}{4} \times \frac{3}{5}$$

$$= \frac{9}{40}$$

$$P_r(bear|scratch) = P_r(bear) \times \frac{P_r(scratch|bear)}{P_r(scratch)}$$

$$= \frac{1}{4} \times \frac{\frac{3}{5}}{\frac{9}{40}}$$

$$= \frac{2}{3}$$

**Answer :**

$$\frac{2}{3}$$

## Worksheet 9

1

$$\chi = [-1, 1]$$

$$y = \{1, 2, 3\}$$

$$\pi_1 = \frac{1}{3}$$

$$\pi_2 = \frac{1}{6}$$

$$\pi_3 = \frac{1}{2}$$

$$P_1 = \begin{cases} \frac{7}{8}, & -1 < x < 0 \\ \frac{1}{8}, & 0 < x < 1 \end{cases}$$

$$P_2 = \begin{cases} 0, & -1 < x < 0 \\ 1, & 0 < x < 1 \end{cases}$$

$$P_3 = \frac{1}{2}, \quad -1 < x < 1$$

$$\pi_1 P_1(x) = \begin{cases} \frac{7}{24}, & -1 < x < 0 \\ \frac{1}{24}, & 0 < x < 1 \end{cases}$$

$$\pi_2 P_2(x) = \begin{cases} 0, & -1 < x < 0 \\ \frac{1}{6}, & 0 < x < 1 \end{cases}$$

$$\pi_3 P_3(x) = \frac{1}{4}, \quad -1 < x < 1$$

$$\max = \begin{cases} \pi_1 P_1(x) = \frac{7}{24}, & -1 < x < 0 \\ \pi_3 P_3(x) = \frac{1}{4}, & 0 < x < 1 \end{cases}$$

**Answer :**

$$h^* = \begin{cases} 1, & -1 < x < 0 \\ 3, & 0 < x < 1 \end{cases}$$

if  $x = 0$ , then  $h^* = 1$  or  $3$ .

# Worksheet 10

1

(a)

**Answer :**

*locations of the center : -9, 0, 9*

$$\begin{aligned} \text{cost} &= (-10 - (-9))^2 + (-8 - (-9))^2 + (0 - 0)^2 + (8 - 9)^2 + (10 - 9)^2 \\ &= 1 + 1 + 0 + 1 + 1 \\ &= 4 \end{aligned}$$

(b)

**Answer :**

-10

-8

6

$$\begin{aligned} \text{cost} &= (-10 - (-10))^2 + (-8 - (-8))^2 + (0 - 6)^2 + (8 - 6)^2 + (10 - 6)^2 \\ &= 0 + 0 + 36 + 4 + 16 \\ &= 56 \end{aligned}$$