Assignment 03

Shubham Shankar
1001761068

1. a) Mean $= \bar{x}$

$$= \frac{2+3+5+4+8+1+9}{7}$$

$$= 4.57143$$

Median = middle element after Sorting

(1, 2, 3, 4, 5, 8, 9)

Since there are odd no of element

Median = 4

$$\text{Variance} = \frac{\Sigma (x_i - \bar{x})^2}{n}$$

$$= \left[(1-4.57143)^2 + (2-4.57143)^2 + (3-4.57143)^2 + (4-4.57143)^2 + (5-4.57143)^2 + (8-4.57143)^2 + (9-4.57143)^2 \right] / 7$$

$$= \left[12.75511 + 6.61225 + 2.46939 + 0.32653 + 0.18367 + 11.75509 + 19.61223 \right] / 7$$

$$= 7.67347$$

1b) Mean $= \frac{1.2 + 1.4 + 1.1 + 1.4 + 5.8}{5} = \boxed{2.18}$

Median $= (1.1, 1.2, 1.4, 1.4, 5.8)$

$= \boxed{1.4}$

Variance $= [(1.1 - 2.18)^2 + (1.2 - 2.18)^2 + (1.4 - 2.18)^2 + (1.4 - 2.18)^2 + (5.8 - 2.18)^2] / 5$

$= [1.1664 + 0.9604 + 0.6084 + 0.6084 + 13.1044] / 5$

$= \boxed{3.2896}$

1c) $\{5, -7, 0, 2, 3\}$

Mean $= \frac{5 - 7 + 0 + 2 + 3}{5} = \boxed{0.6}$

Median $= -7, 0, 2, 3, 5$

$= \boxed{2}$

Variance $= [(-7 - 0.6)^2 + (0 - 0.6)^2 + (2 - 0.6)^2 + (3 - 0.6)^2 + (5 - 0.6)^2] / 5$

$= \frac{57.76 + 0.36 + 1.96 + 5.76 + 19.36}{5}$

$= \boxed{17.04}$

(d) (1, 2, 1, 1, 3, 1, 1, 6)

Mean = $\frac{1+2+1+1+3+1+1+6}{8}$ = **2**

Median = (1, 1, 1, 1, 1, 2, 3, 6)

Since it even

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

Variance = $[(1-2)^2+(1-2)^2+(1-2)^2+(1-2)^2+(1-2)^2 + (2-2)^2 + (3-2)^2 + (6-2)^2] / 8$

$(1+1+1+1+1+0+1+16) / 8$

= **2.75**

2) a

Probability that packet dropped at A = 0.2
Probability that packet dropped at B = 0.1

Probability that packet didn't get dropped at A = 1 − 0.2 = 0.8

probability that packet didnt get dropped at B = 1 − 0.1 = 0.9

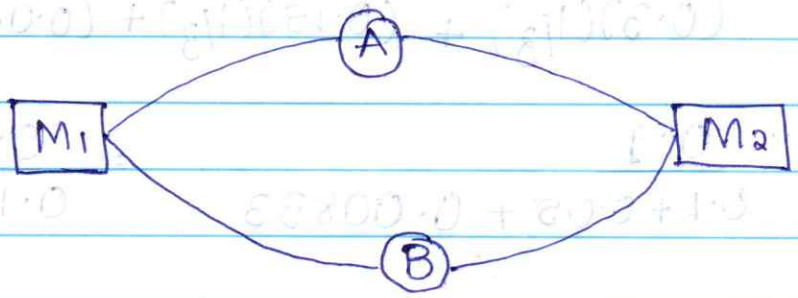
a) Probability of packet not arriving at destination M_2 =

$$P(\bar{A}) * P(\bar{B})$$

$$= 0.8 * 0.9 = \boxed{0.72}$$

ie packet didnt pass through A & B to reach M_2.

b)



Since A & B are parallel, packet will reach M_2, if atleast packet gets dropped of at any one routers.

prob of packet being dropped at A or B

$$= P(A) * P(B) = 0.2 \times 0.1 = 0.02$$

prob of packet reaching M_2

$$= 1 - 0.02 = \boxed{0.98}$$

③ probability of Box = probability of cylinder = probability of sphere = $1/3$

$$P(OB/C_4) = \frac{P(C_4/OB) \cdot P(OB)}{P(C_4)}$$

$$= \frac{P(C_4/OB) \cdot P(OB)}{\left(P(C_4/OB) \cdot P(C_4/OC) \cdot P(C_4/OS)\right) 1/3}$$

$$= \frac{(0.3) \cdot (1/3)}{(0.3)(1/3) + (0.15)(1/3) + (0.025)(1/3)}$$

$$= \frac{0.1}{0.1 + 0.05 + 0.00833} = \frac{0.1}{0.15833}$$

$$= \boxed{0.63159}$$

$$P(OC/C_4) = \frac{P(C_4/OC) \cdot P(OC)}{0.15833}$$

$$= \frac{(0.15)(1/3)}{0.15833} = \boxed{0.31579}$$

$$P(OS/C_4) = \frac{(0.025)(1/3)}{0.15833} = \boxed{0.05263}$$

b) $P(OB) = 0.4$

$P(OC) = 0.35$

$P(OD) = 0.25$

2 corner

$$P(OB|C_2) = \frac{P(C_2|OB) \cdot P(OB)}{P(C_2}$$

$$= \frac{P(C_2|OB) \cdot P(OB)}{P(C_2|OB) \cdot P(OB) + P(C_2|OC) \cdot P(OC) + P(C_2|OD) \cdot P(OD)}$$

$$= \frac{(0.1)(0.4)}{(0.1)(0.4) + (0.2)(0.35) + (0.15)(0.25)}$$

$$= \frac{0.04}{0.1475} = \boxed{0.27119}$$

$$P(OC|C_2) = \frac{(0.2)(0.35)}{0.1475} = \boxed{0.47458}$$

$$P(OD|C_2) = \frac{(0.15)(0.25)}{0.1475} = \boxed{0.25424}$$