

19/04/22

Statistics & Probability exam

Manappan's
19BEC4118

1) $S = 52$ cards

[3 cards are drawn without replacement]

$$= P[\text{one diamond, one heart, one spade}]$$

$$= P[\text{diamond}] \times P[\text{heart}] \times P[\text{spade}]$$

$$= P\left(\frac{13}{52}\right) \times P\left(\frac{13}{51}\right) \times P\left(\frac{13}{50}\right)$$

$$= \frac{13}{52} \times \frac{13}{51} \times \frac{13}{50}$$

$$= \frac{1}{4} \times \frac{13}{51} \times \frac{13}{50}$$

$$= 0.0165$$

2) $P(\text{action movies}) = \frac{42}{100} \rightarrow P(A)$

$$P(\text{comedy movies}) = \frac{54}{100} \rightarrow P(B)$$

$$P(\text{drama movies}) = \frac{36}{100} \rightarrow P(C)$$

$$P(\text{horror movies}) = \frac{12}{100} \rightarrow P(D)$$

$$P(A \cap C) = 0$$

$$P(B \cap D) = 0$$

$$(P(A) + P(C) - P(A \cap C))$$

$$\text{Either action or drama movies} = \frac{42}{100} + \frac{36}{100} - 0$$

$$= \frac{78}{100}$$

$$= 0.78$$

$$\text{Either comedy or horror movies} = \frac{54}{100} + \frac{12}{100} - 0$$

$$= \frac{66}{100}$$

$$= 0.66$$

3)

Bag A

Red = 3

Black = 5

Bag B

White = 4

Black = 7

$$P(A) = 1/2, \quad P(B) = 1/2$$

$$P\left(\frac{\text{Black}}{A}\right) = 5/8, \quad P\left(\frac{\text{Black}}{B}\right) = 7/11$$

$$P\left(\frac{B}{\text{Black}}\right) = \frac{P(B) \times P\left(\frac{\text{Black}}{B}\right)}{P(A) \times P\left(\frac{\text{Black}}{A}\right) + P(B) \times P\left(\frac{\text{Black}}{B}\right)}$$

$$= \frac{1/2 \times 7/11}{\left[1/2 \times 5/8\right] + \left[1/2 \times 7/11\right]} = \frac{7/22}{\frac{5}{16} + \frac{7}{22}}$$

$$= \frac{7/22}{\frac{110+112}{352}} = \frac{7/22}{\frac{222}{352}} = 7/22 \times \frac{352}{222}$$

$$= \frac{2464}{4884} = 0.50450$$

$$P\left(\frac{B}{\text{Black}}\right) = 0.50450$$

4) Given:-

450 applications in 1 hour

By poisson distribution

$$a) \lambda = 450$$

$$\lambda = 15/2, \quad \lambda = 10$$

$$P(X=x) = \frac{e^{-15/2} \cdot (15/2)^x}{x!} = 0.0858$$

4)

b)

$$P(X=x) = e^{-15/2} \cdot (15/2)^{17}$$

$$= 0.6321$$

$$\frac{325}{110+15} = \frac{325}{125} = 2.6$$

$$0.20420 = \frac{4.884}{5.404}$$

$$P(\text{Block}) = 0.20420$$

is in 1 hour
minutes

$$= 10$$

$$(1/5)^{10}$$

6)

$$Z = \frac{X - \mu}{\sigma}$$

$$0.675 = \frac{X - 350870}{12405}$$

$$X = 350870 + (0.675 \times 12405)$$

$$X = 359237.045$$

$$75^{\text{th}} \text{ percentile} = 359237.045$$