8/04/22

probability & Statistics

1.) cards = 52
diamond = 13
heart = 13
spade = 13

Probability that one card is diamond, one card is heart and one card is spade

$$= \frac{{}^{13}C_1 \times {}^{13}C_1 \times {}^{13}C_1}{{}^{52}C_3}$$

$$= \frac{13 \times 13 \times 13}{52 \times 51 \times 50} = \frac{2197}{132600}$$

Probability = 0.0165

2.] action movies = 42%
comedy movies = 54%
Drama movies = 36%
horror movies = 12%

total = 144

P(action or drama) = P(action) + P(drama)

$$= \frac{42}{144} + \frac{36}{144} = \frac{78}{144}$$

P(action or drama) = 0.5416

$$P(\text{Comedy or horror}) = P(\text{comedy}) + P(\text{horror})$$

$$= \frac{54}{144} + \frac{12}{144}$$

$$= \frac{66}{144}$$

$$\boxed{P(\text{Comedy or horror}) = 0.4583}$$

3] bag A → red - 3, black - 5

bag B → White - 4,

$$P(A) = 1/2$$

$$P\left(\frac{\text{Black}}{A}\right) = 5/8$$

$$P(B) = \frac{1}{2}$$

$$P\left(\frac{\text{Black}}{B}\right) = \frac{7}{11}$$

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

$$= \frac{\frac{1}{2} \times \frac{7}{11}}{\left(\frac{1}{2} \times 5/8\right) + \left(\frac{1}{2} \times \frac{7}{11}\right)}$$

$$= 0.5045$$

4.) Given 450 applications for 1 hour:-

a) by poisson's distribution

$$\lambda = \frac{450}{60}$$

$$\lambda = 15/2$$

$$P(X=x) = e^{-15/2} \cdot (15/2)^{10} / 10!$$

$$= 0.0858$$

b) by poisson's distribution.

$$\lambda = \frac{15}{\cancel{450}}$$

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

6.) Solution

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

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

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

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

75th percentile = 359 237.045