Statistics and probability

1] $n(S) = 52$

Probability of card diamond,

$$P(\text{diamond}) = \frac{13}{52}$$

$$P(\text{heart}) = \frac{13}{52}$$

$$P(\text{spade}) = \frac{13}{52}$$

when three cards are drawn at random,

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

Probability = 0.01656

2] 48 % ⇒ action movies P(action)

54 % ⇒ comedy movies P(comedy)

36 % ⇒ drama movies P(drama)

18 % ⇒ horror movies P(horror)

a) P(either action or drama) = P(action) + P(drama) − P(action + drama)

= 48 + 36 − 0

P(either action or drama) = 78

b) $P(\text{either comedy or horror})$

$= P(\text{comedy}) + P(\text{horror}) - P(\text{comedy \& horror})$

$= 54 + 12 - 0$

$P(\text{either comedy or horror}) = 66$

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3)

A

Red	3
Black	5

B

white	4
black	7

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

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

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

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

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

$$= \frac{\frac{7}{22}}{\frac{5}{16} + \frac{7}{22}} = \frac{\frac{7}{22}}{\frac{110+112}{352}}$$

$$= \frac{\frac{7}{22}}{\frac{222}{352}} = \frac{7}{22} \times \frac{352}{222}$$

$$= \frac{2464}{4884} = 0.5045$$

$$P\left(\frac{B}{Black}\right) = 0.5045$$

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4) In one hour = 450 applications

λ (mean) $= \frac{450}{60 \text{ mins}}$ app $= 45/60 = \frac{15}{2} = 7.5$ per minute

a) Receiving 10 applications in 1 minute.

Poisson distribution $P(X=x) = \frac{\lambda^x e^{-\lambda}}{x!}$

$$P(X=10) = \frac{(7.5)^{10} e^{-7.5}}{10!}$$

$$= \frac{5631351470.947266 \times 0.00055}{3628800}$$

$$P(X=10) = 0.0858.$$

b) $P('x = 17) = \frac{(7.5)^{17} e^{-7.5}}{17!}$

$P(x = 17) = 3.7991\, e^{-7}$

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6) $Z = \frac{X - M}{\sigma}$

$0.675 = \frac{X - 350870}{1240.5}$

$X = 350870 + (0.675 \times 1240.5)$

75th percentile $= 359837.045$

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7) The value of $F \Rightarrow 44^2 + 21^2 + 36^2 + 3\cancel{6}^2 + 77^2 + 32^2 + \cancel{2}^2 + 39^2 + 92^2 + 67^2 + 45^2 + 37^2$

$47^2 + 81^2 + 41^2 + 79^2 + 38^2 + 20^2 + 33^2 + 8\cancel{3}^2 + 41^2 + 40^2 + 69^2 + 3\cancel{6}^2$

$$= \frac{30491}{35852}$$

$F_{value} = 0.8504$