# Assignment 3

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Assignment-3 20241068

1. Total cards = (3×4) = 12

∴ Total not face cards = (52-12) = 40

∴ Prop

∴ Probability of not getting a face card $P(N) = \frac{^{40}C_4}{^{52}C_4}$

$= 0.361$

∴ Probability of getting at least one face card $P(F)$

$= 1 - P(N)$

$= 1 - 0.34$

$= 0.66$ [Ans]

2. Selected student = 40

Might get 'A' = 4

Might get 'C' = 3

∴ Probability of getting award for every student = $4^{10}$

∴ Probability of getting award for 'A' and 'C' student

$= \frac{10!}{4!3!} \times \frac{}{4^{10}}$

$= 0.0240$ [Ans]

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3. (a) Total questions = 9

Total options = 3

∴ Probability of exactly 6 question right

$$= \frac{{}^9C_6 \times 2^3}{3^9}$$

$$= 0.0341$$ [Ans]

(b) Probability of getting at most 6 question right

$$= 1 - \frac{{}^9C_6 + ({}^9C_8 \times 2^1) + ({}^9C_9 \times 2^2)}{3^9}$$

$$= 0.9912$$

[Ans]

4 $P(n) = 1 - \left(\frac{364}{365}\right)^{\frac{n(n-1)}{2}}$

$\Rightarrow 0.6 = 1 - \left(\frac{364}{365}\right)^{\frac{n(n-1)}{2}}$

$\Rightarrow \left(\frac{364}{365}\right)^{n(n-1)/2} = 1 - .60$

$\Rightarrow \frac{n(n-1)}{2} \log \frac{364}{365} = \log 0.40$

$\Rightarrow \frac{n(n-1)}{2} = \frac{\log 0.40}{\log \frac{364}{365}}$

$\Rightarrow n(n-1) = 2(333.98282)$

$\Rightarrow n^2 - n = 662.9255$

$\Rightarrow n^2 - n - 668 = 0$

$\Rightarrow n = 26.3$ or $n = 25.3$

$\therefore n = 26$

$\therefore$ The maximum number of people ~~are~~ is 26.

[Ans]

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~~$\rightarrow (pc-19)(pc+18) = 0$~~

~~$\rightarrow pc = 19 \rightarrow pc = -18$~~

~~∴ So, 19 is the max number of people.~~

~~Ans~~

5 (a)

Number of candles = 5

Total gusses = $3^5$

Total number of exactly 4 correct gusses

$$= \frac{5C_4 \times (\frac{1}{4})^4 \times (\frac{4}{5})}{5^5}$$

$$= 5 \times 10^{-6} \quad [Ans]$$

(b) Total events = 1

Total number of exactly 4 correct gusses = $5 \times 10^{-6}$

∴ Robablity of correct guess after showing him one correct answer = $(1 - 5 \times 10^{-6})$

$$= 0.999995$$ [Ans]

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6. Probability of head $P(H) = 0.5$ [Fair coins]

probability of tail $P(T) = 0.5$

Fair coins = 8

unfair coins = 12

$\therefore$ P (Head for unfair coins) = 0.75

P (Tail for unfair coins) = 0.25

Let,

~~Probability of~~

Picking unfair coins = A

coin being heads = B.

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{P(A \cap B)}{P(A \cap B) + P(A^c \cap B)}$$

$\therefore$ Probability of fair coins having x heads out of 9 flips

$$= {}^9C_x \times (0.5)^9$$

~~Probability~~

Probability of unfair coins having x heads out of 9 flips

$$= {}^9C_x \times (0.75)^x \times (0.25)^2$$

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$\therefore P(A \cap B) = \frac{8}{20} \times {}^{9}C_{2} \times (0.5)^{9}$

$= 0.028$

$P(A^c \cap B) = \frac{12}{20} \times {}^{9}C_{2} \times (0.75)^{2} \times (0.25)^{2}$

$= 0.180$

$\therefore P(A^c|B) = \frac{P(A^c \cap B)}{P(A^c \cap B) + P(A \cap B)}$

$= \frac{0.180}{0.180 + 0.028}$

$= 0.86538$

[Ans]