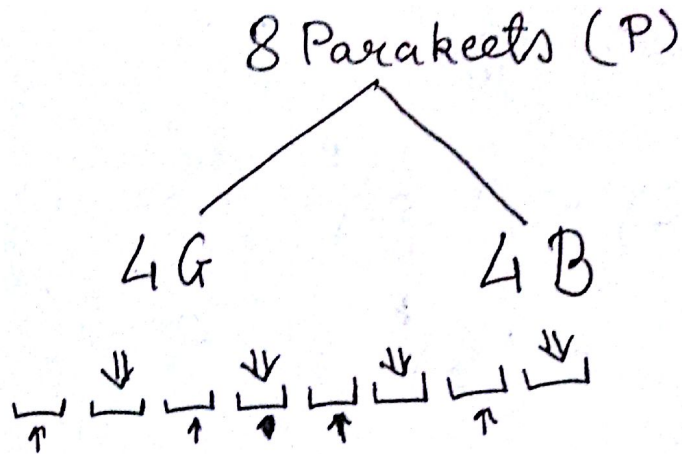


①



In question as said that no 'P' of same color can sit together.

So green P can sit on \uparrow or ~~all of them~~ sit on \downarrow

And all the possible permutation is $\frac{8!}{4! \times 4!} = 70$

So probability that no two adjacent parakeets are of same color = $\frac{2}{70} = .0286$

2

$$P(\text{having manufacturing defect}) = \frac{3}{10}$$

a) $P_{\text{no}}(\text{no core is defective}) = \left(1 - \frac{3}{10}\right)^8$

$$= \left(\frac{7}{10}\right)^8 = .058$$

b)

No. of Core Functioning	Probability $\times 1000$
1	${}^8C_1 \times .7^1 \times .3^7 \times 1000 = 1.22$
2	${}^8C_2 \times .7^2 \times .3^6 \times 1000 = 10.01$
3	${}^8C_3 \times .7^3 \times .3^5 \times 1000 = 46.67$
4	${}^8C_4 \times .7^4 \times .3^4 \times 1000 = 136.14$
5	${}^8C_5 \times .7^5 \times .3^3 \times 1000 = 254.12$
6	${}^8C_6 \times .7^6 \times .3^2 \times 1000 = 296.47$
7	${}^8C_7 \times .7^7 \times .3 \times 1000 = 197.65$
8	${}^8C_8 \times .7^8 \times 1000 = 57.64$

so, No. of Great Model = $1.22 + 10.01 + 46.67 \approx 58$

No. of Advance Model = $136.14 + 254.12 + 296.47 + 197.65$
 ≈ 884

No. of Extreme Model ≈ 58

$$\begin{aligned} \text{c) Expected Revenue} &= 58 \times 50 + 884 \times 100 \\ &\quad + 1000 \times 58 \\ &= \$149300 \end{aligned}$$

Problem 3

Defendant guilty $\rightarrow C_G$

So given:

$$P(J_G | C_G) = .7$$

$$P(J_G | \bar{C}_G) = .2$$

$$P(C_G) = .7$$

a) ~~J_G~~ Judge votes guilty $\rightarrow J_G$

$$P(C_G | J_G) = ?$$

$$= \frac{P(J_G | C_G) \times P(C_G)}{P(J_G)}$$

$$= \frac{.7 \times .7}{P(J_G | C_G) \times P(C_G) + P(J_G | \bar{C}_G) \times P(\bar{C}_G)}$$

$$= \frac{.49}{.7 \times .7 + .2 \times .3}$$

$$\boxed{P(C_G | J_G) = .89}$$

b) $\bar{G} \mid J_{G1}, J_{G2}, J_{G3} \rightarrow$ Votes guilty.

$$P(G \mid J_{G1}, J_{G2}, J_{G3}) = ?$$

$$= \frac{P(J_{G1}, J_{G2}, J_{G3} \mid G) \times P(G)}{P(J_{G1}, J_{G2}, J_{G3})}$$

Since each judge votes independently so

$$= \frac{P(J_{G1} \mid G) \times P(J_{G2} \mid G) \times P(J_{G3} \mid G) \times P(G)}{P(J_{G1}, J_{G2}, J_{G3})}$$

$$= \frac{(P(J_{G1} \mid G) \times P(J_{G2} \mid G) \times P(J_{G3} \mid G) \times P(G) + P(J_{G1} \mid \bar{G}) \times P(J_{G2} \mid \bar{G}) \times P(J_{G3} \mid \bar{G}) \times P(\bar{G}))}{P(J_{G1}, J_{G2}, J_{G3})}$$

$$= \frac{.7 \times .7 \times .7 \times .7}{(.7)^4 + (.2)^3 \times .3} = \frac{.24}{.24 + .018} = .93$$

So $P(G \mid J_{G1}, J_{G2}, J_{G3}) = .93$

So $P(G \mid J_{G1}, J_{G2}, J_{G3}) = .99$