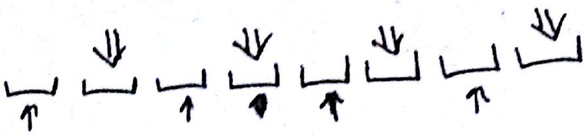
①

8 Parakeets (P)

4G 4B



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 passible permutation is $\frac{8!}{4! \times 4!} = 70$

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

2

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

a) P (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

c) Expected Revenue $= 58 \times 50 + 884 \times 100$

$+ 1000 \times 58$

$= \$149300$

Problem 3

Defendent guilty $\longrightarrow$ G

So given:

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

$$P(J_G | \overline{G}) = .2$$

$$P(G) = .7$$

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

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

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

$$= \frac{.7 \times .7}{P(J_G|G) \times P(G) + P(J_G|\overline{G}) \times P(\overline{G})}$$

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

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

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b) $J_{G1}, J_{G2}, J_{G3} \rightarrow$ 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 independenty so

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

$$= \frac{.7 \times .7 \times .7 \times .7}{(.7)^4 + (.2)^3 \times .3} = \cancel{.24} \quad .99$$

~~So $P(G \mid J_{G1}, J_{G2}, J_{G3}) = .24$~~

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

c) $J_{\bar{G1}}$, $J_{\bar{G2}}$ $\Rightarrow$ Judg1 and Judge2 votes innocet

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

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

so $P(J_{G3} \cap J_{\bar{G1}} \cap J_{\bar{G2}}) = P(J_{\bar{G1}} \mid J_{G3}) \times P(J_{\bar{G2}} \mid J_{G3}) \times P(J_{\bar{G2}} \mid J_{G3}) \times P(J_{G3})$

~~$+P(G_1 - G$~~

$+ P(J_{\bar{G1}} \mid J_{\bar{G3}}) \times P(J_{\bar{G2}} \mid J_{\bar{G3}}) \times P(J_{\bar{G3}})$

$= .0825.$

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

$= .255$

so $P(J_{G3} \mid J_{\bar{G1}}, J_{\bar{G2}}) = .32$