①

8 Parakeets (P)

4 G   4 B
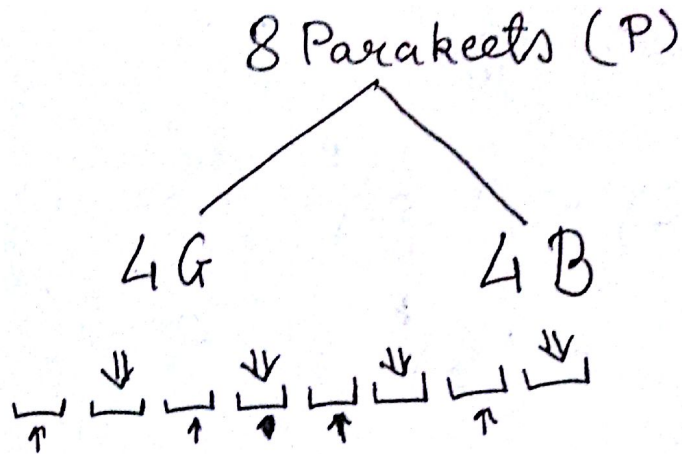
In question as said that no `P' of same color can sit together.

So Green P can sit on ↑ or ~~all of these~~ sit on ↓

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

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

2

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

a) P_{00} (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 $\rightarrow$ G

So given:

$$P(J_{uG} | G) = .7$$

$$P(J_{uG} | \bar{G}) = .2$$

$$P(G) = .7$$

a) $\cancel{J_{uG}}$ Judge votes guilty $\rightarrow$ J_G

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

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

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

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

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

b) J_{G1}, J_{G2}, J_{G3} → 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

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

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

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

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

c) $\quad J_{\bar{G}1}, J_{\bar{G}2} \Rightarrow$ Judg1 and Judge 2 votes innocet

$$P(J_{G3} \mid J_{\bar{G}1}, J_{\bar{G}2}) = 2$$

$\longrightarrow \quad P(A|B) = \dfrac{P(A \cap B)}{P(B)}$

$\Delta_0 \quad P(J_{G3} \cap J_{\bar{G}1} \cap J_{\bar{G}2}) = P(J_{\bar{G}1} \mid J_{G3}^0)$
$\times P(J_{\bar{G}2} \mid J_{G3})$
$\times P(J_{\bar{G}2} \mid J_{G3}) \times P(J_{G3} \mid$

$\overline{P(G_1 = \bar{G}}$
$+ P(J_{\bar{G}1} \mid J_{\bar{G}3}) \times P(J_{\bar{G}2} \mid J_{\bar{G}3})$
$\times P(J_{\bar{G}3})$

$= \cdot 0825.$

$P \quad P(J_{\bar{G}1}, J_{\bar{G}2}) = P(J_{\bar{G}1} \mid G) \times P(J_{\bar{G}2} \mid G)$
$\times P(G)$
$+ P(J_{\bar{G}1} \mid \bar{G}) \times P(J_{\bar{G}2} \mid \bar{G})$
$\times P(\bar{G})$

$= \cdot 255$

$\Delta_0 \quad P(J_{G3} \mid J_{\bar{G}1}, J_{\bar{G}2}) = \cdot 32$

$\frac{4}{}$

```
    RDI              RD2              RD3
┌──────────┐     ┌──────────┐     ┌──────────┐
│ Rain day1│ ──→ │Rain day 2│ ──→ │Rain day³ │
└──────────┘     └──────────┘     └──────────┘
                                          ╲ ↓ RD4
                                       ┌──────┐
                                       │ Rain │
                                       │day 4 │
                                       └──────┘
     ↓ R1            ↓ R2            ↓ R3     ↓ R4
┌──────────────┐ ┌──────────┐ ┌──────────┐ ┌──────────┐
│Computer Recieve│ │ Computer │ │ Computer │ │ Computer │
│  day1.        │ │Recieve Day2│ │Recieve D3│ │Recieve D4│
└──────────────┘ └──────────┘ └──────────┘ └──────────┘
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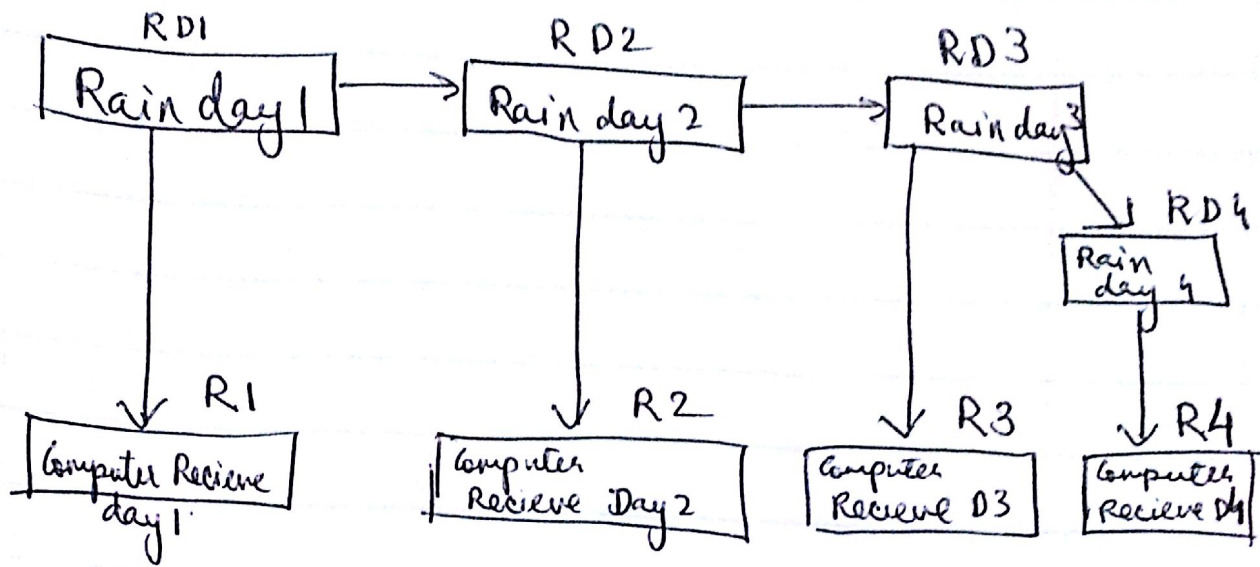
4 Observed Vario

(b) ~~P(RD1=1|R~~

$$P(RD4 = 1 \mid RD1=1, R1=1, R2=1, R3=0, R4=1)$$

$$= \frac{P(RD1=1, R1=1, R2=1, R3=0, R4=1 \mid RD_4 =1) \times P(RD4)}{P(RD4=1, R1=1, R2=1, R3=0, R4=1)}$$