Derangement

$B_1 \quad B_2 \quad B_3 \quad B_4 \quad B_5$

$G_1 \quad G_2 \quad G_3 \quad G_4 \quad G_5$

$$D(n) = n!\left[\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} \cdots (-1)^n \frac{1}{n!}\right]$$

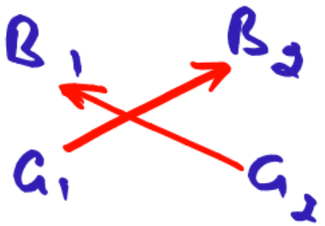
① $D(1) = 0$

B_1

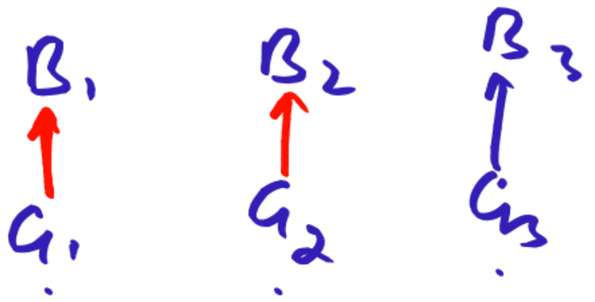
G_1

② $D(2) = 1$

$D(2) = 2!\left(\frac{1}{2!}\right) = 1$



$D(3) =$



$$D(3) = 3!\left[\frac{1}{2!} - \frac{1}{3!}\right]$$

$$= 6\left(\frac{1}{2} - \frac{1}{6}\right)$$

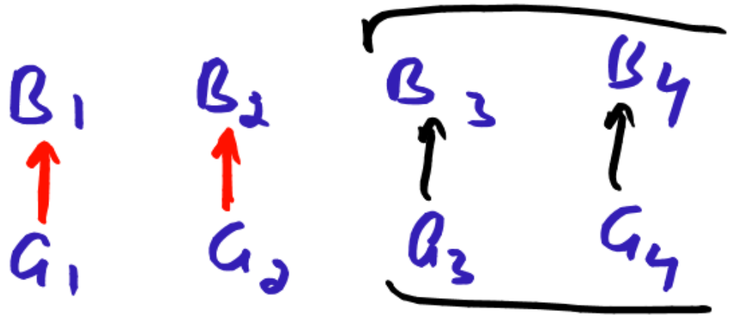
$$= 6\left(\frac{2}{6}\right) = 2$$

$D(3) = Total - \{(1R, 2W) + (2R, 1W) + (3R, 0W)\}$

$= 3! - \{{}^3C_1 \times 1 + 0 + 1\}$

$= 6 - \{3 + 0 + 1\} = (2)$

$D(4) =$



$$D(4) = 4!\left(\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!}\right)$$

$$= 24\left(\frac{1}{2} - \frac{1}{6} + \frac{1}{24}\right)$$

$$= 24\left(\frac{12 = 4+1}{24}\right)$$

$$= 9$$

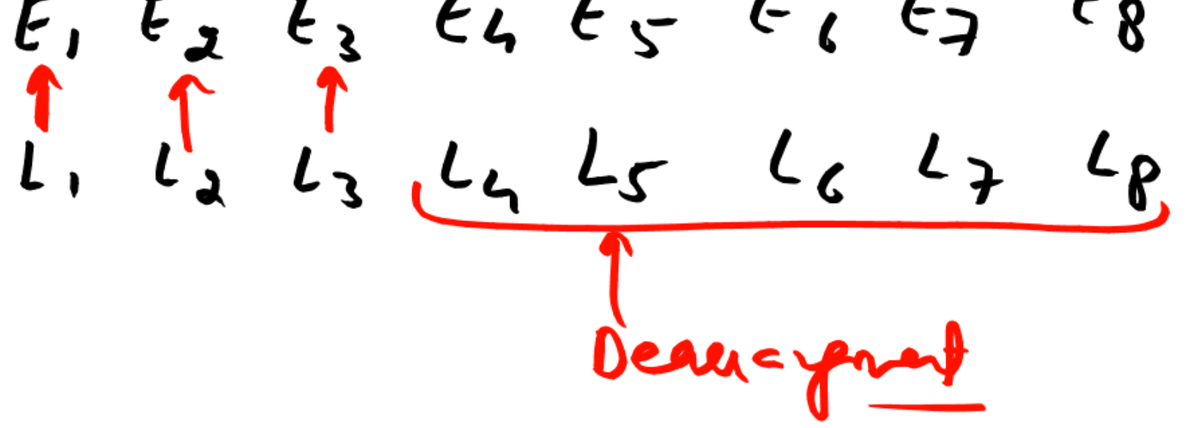
Total − {(1R, 3W) + (2R, 2W) + (3R, 1W) + (ALL R)} = 9

$= 4! - \{ {}^4C_1 \cdot 2 + {}^4C_2 \cdot 1 + 0 + 1 \}$

$= 24 - \{ 8 + 6 + 0 + 1 \}$

$= 24 - 15 = 9$

Q. In how many ways 8 letters (चिट्ठी) can be placed in 8 directed envelops if exactly 5 goes to incorrect address



(3R.5W)

$8C_3 \times D(5)$

56×44

$(50+6) \times (50-6)$

$= 2500 - 36 = 2464$

Q. Match the Qns.

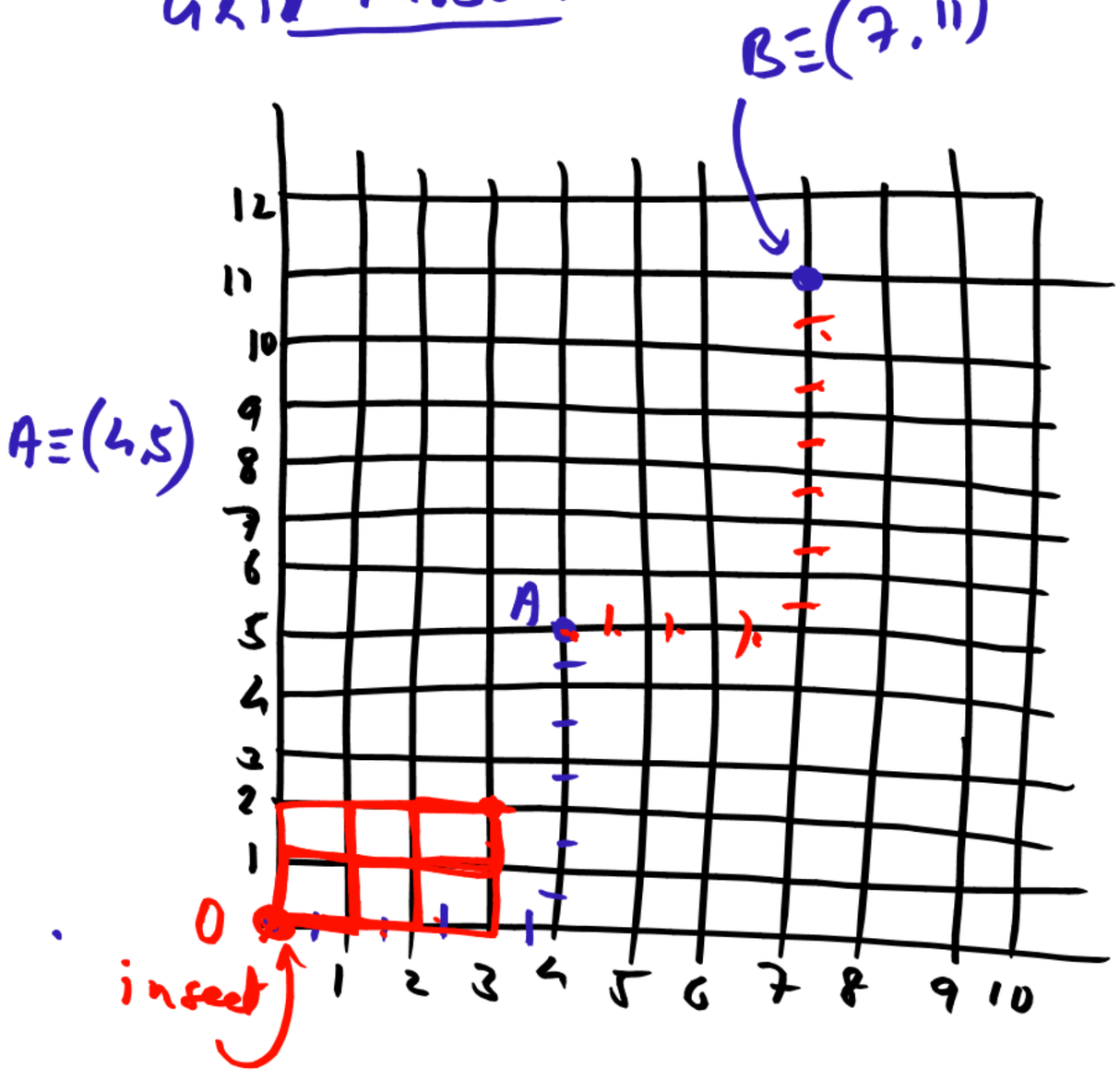
Q_1	A_1
Q_2	A_2
Q_3	A_3
Q_4	A_4
Q_5	A_5
Q_6	A_6
Q_7	A_7
Q_8	A_8

{ for correct Answer +2 marks will be given & for incorrect Q −1 will be given. In how many a student can secure positive marks (All Question are to be attempt)

Total − $\{8W + 1R, 7W + 2R, 6W\}$

$8! - \{D(8) + {}^8C_1 \cdot D(7) + {}^8C_2 \cdot D(6)\}$

Grid Problem



(insect can move 1 unit in right or up at a time)

Q. In how many ways insect can go from 0 to A

Q. In how many ways insect can go 0 to B via A

Q.3 0 to B (X A)

HW

① Total steps = 9

Horizontal step = 4 (Alike)

Vertical steps = 5 (Alike)

total no. of ways in which go O to A = $\frac{9!}{4! \cdot 5!}$

② O to B (via. A)

$O \rightarrow A \rightarrow B$

$\left(\frac{9!}{4!5!} \times \frac{9!}{3!6!} \right)$

{ O to (3,2)

$\frac{5!}{3!2!} = \frac{5 \times 4}{2}$

$= 10$ }