Name: Md. Sabbir Rahman ID: 170507(

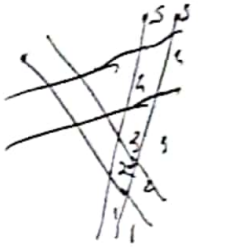
## Ans. to Q. no. 1

Let $P(n)$ = number of region by $n$ pair of parallel lines

$P(1) = 3, \quad P(2) = 9.$

now, for $P(n+1)$, the last pair of line, each will intersect $P$

$2n$ lines and create $2n+1$ regions each.



3nd line creates 5 regions

So, $P(n+1) = P(n) + 4n + 2$

no., $P(n) - P(n-1) = 4(n-1) + 2$

$P(n-1) - P(n-2) = 4(n-2) + 2$

$\vdots$

$P(2) - P(1) = 4 \cdot 1 + 2$

} adding

$P(n) - P(1) = 4 \cdot \frac{n(n-1)}{2} + (n-1) \cdot 2 = 2(n-1)(n+1)$

$\Rightarrow P(n) = 2n^2 - 2 + 3 = 2n^2 + 1$

[Ans]

# Ans. to Q. no. 2

76 roll → $n = 923$

now, for last person, $J(2n) = 2J(n) - 1$ $\quad J(1) = 1$

$J(2n+1) = 2J(n) + 1$

2nd last person, $S(2n) = 2S(n) - 1$ $\quad S(2) = 1$

$S(2n+1) = 2S(n) - 1$ $\quad S(3) = 1.$

So, $J(923) = 2 \times J(461) + 1$

$= 4 \times J(230) + 2 + 1$

$= 8 \times J(115) - 4 + 2 + 1$

$= 16 \times J(57) + 8 - 4 + 2 + 1$

$= 32 \times J(28) + 16 + 8 - 4 + 2 + 1$

$= 64 \times J(14) + 32 + 16 + 8 - 4 + 2 + 1$

$= 128 \times J(7) - 64 - 32 + 16 + 8 - 4 + 2 + 1$

$= 256 \times J(3) + 128 - 73$

$= 512 \times J(1) + 256 + 128 - 73 = 823.$ [Ans.]

similarly for 2nd last, $S(923) = 256 \times S(3) + 128 - 73$

$= 311$ [Ans]