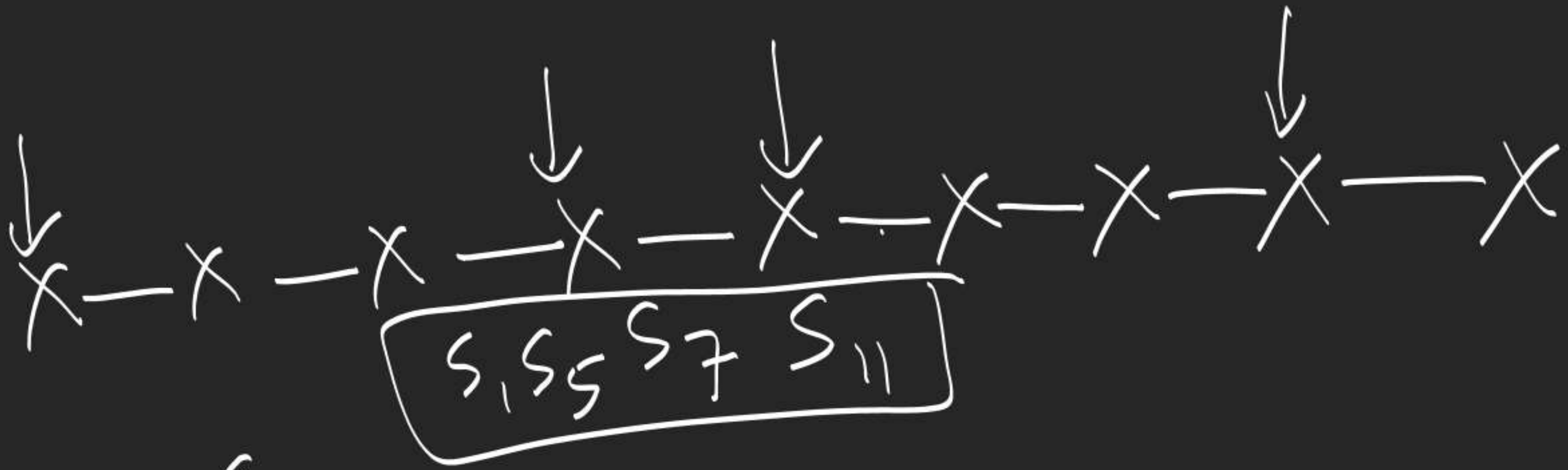
Nishant Jindal

1.



$^9C_4$

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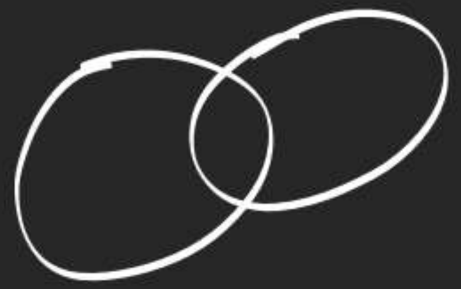
Q: If there are 8 straight lines & 6 circles in a plane. Find the maximum no. of their intersection points possible.

A, B, C, . . . , J, K



$${}^8C_2 \times 1 + {}^8C_1\,{}^6C_1 \times 2 + {}^6C_2 \times 2.$$

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$3!$

A G J

G A J

AGJ $\longrightarrow$ $3!$

2

$^{11}C_3 \times 2 \times 8!$

$$\frac{11!}{3!} \times 2$$

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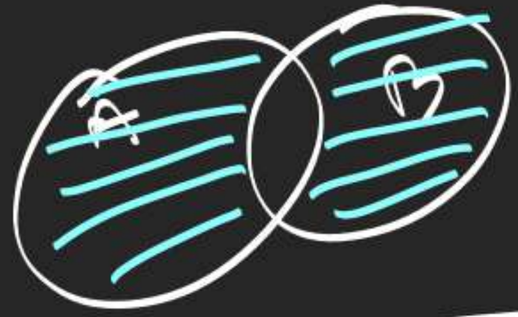
Inclusion & Exclusion Principle

$n(A) - n(A \cap B)$

$n(A - B)$ = Find no. of elements which belong to A but not B.

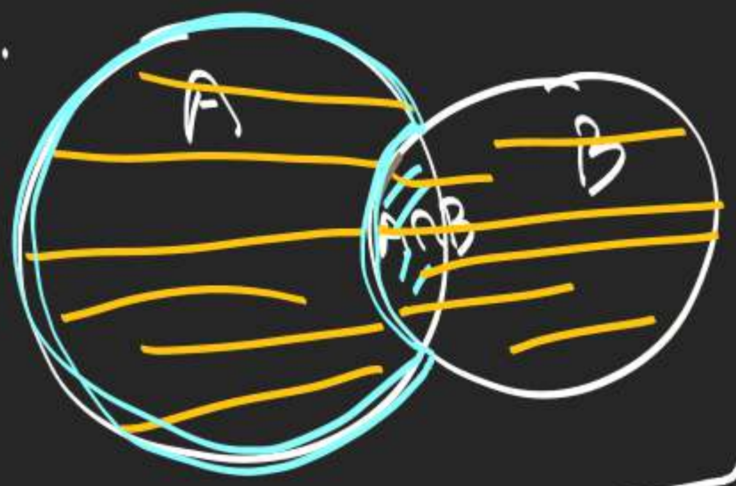
no. of elements which belong to exactly one of two sets A or B

$= n(A \cup B) - n(A \cap B)$



$= n(A) + n(B) - 2n(A \cap B)$

no. of elements which belong to A or B (atleast one of A, B)



$$\boxed{n(A \cup B) = n(A) + n(B) - n(A \cap B)}$$

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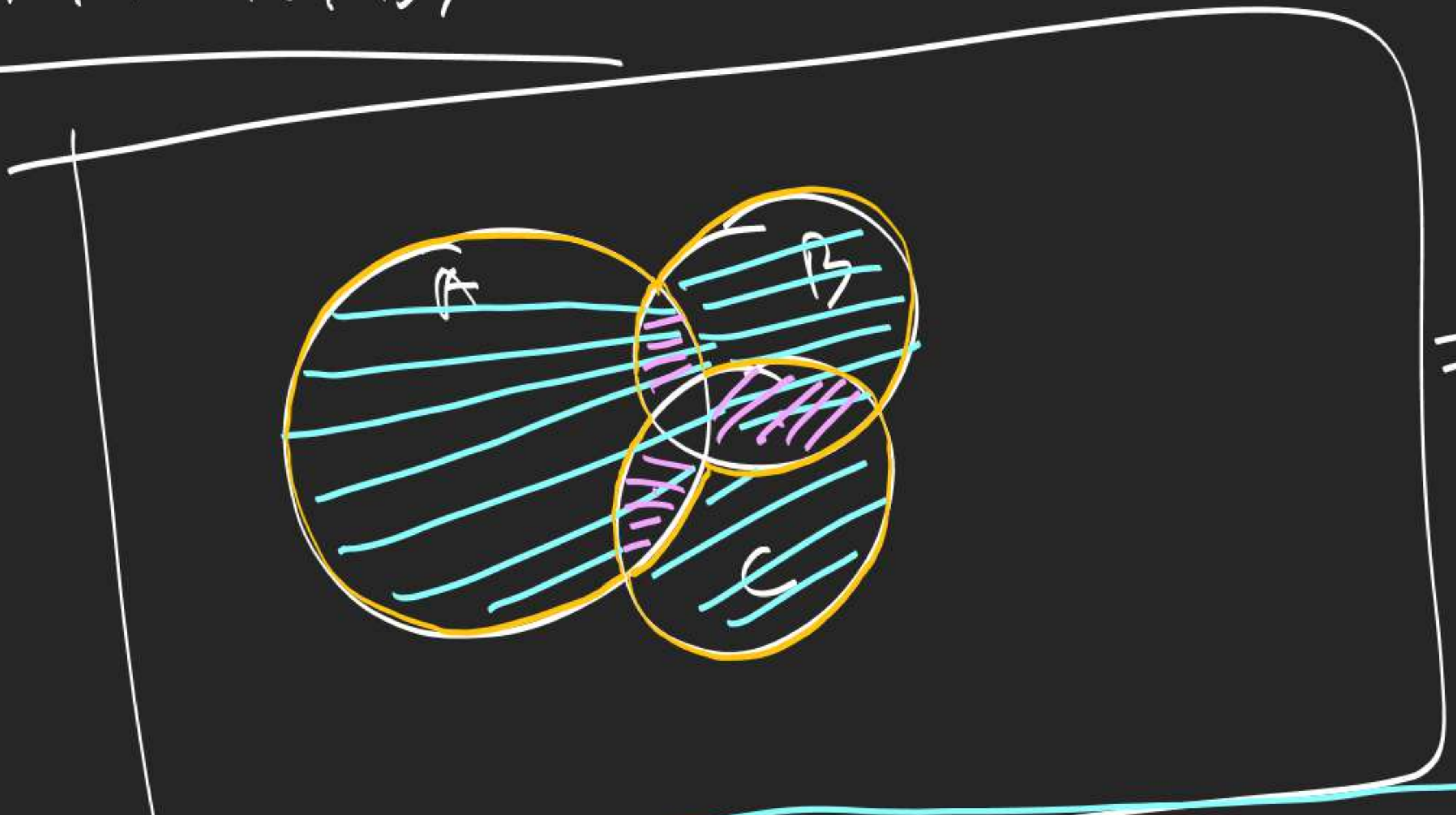
no. of element that belong to atleast one of 3 set A, B, C



$$n(A \cup B \cup C) = \big(n(A)+n(B)+n(C)\big) - \big(n(A\cap B) + n(B \cap C) + n(C \cap A)\big) + n(A \cap B \cap C)$$

$$\boxed{n(A \cup B \cup C) = n(A)+n(B)+n(C) - \big(n(A\cap B)+n(B\cap C)+n(C\cap A)\big) + n(A\cap B\cap C)}$$

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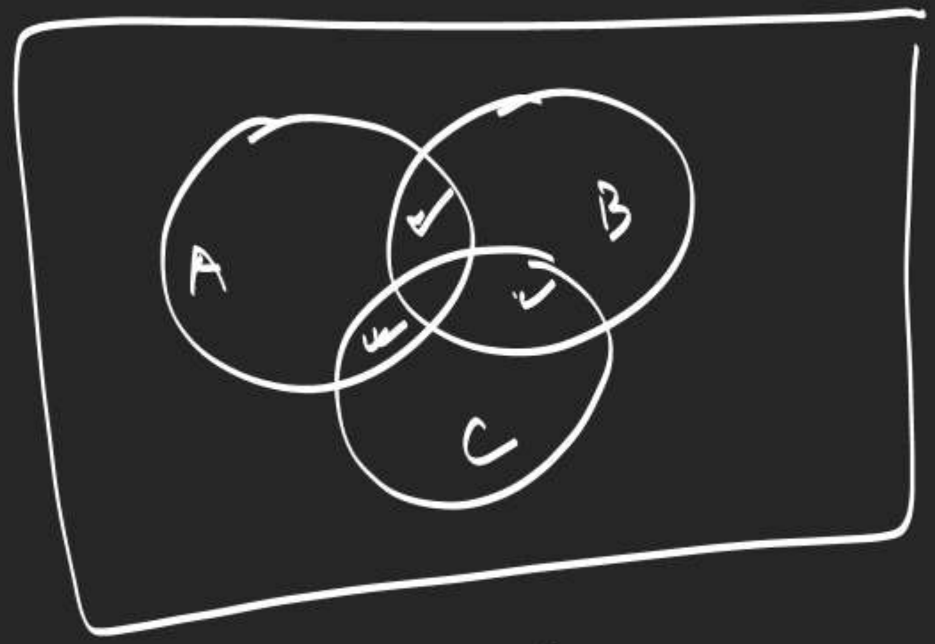
Find no. of elements that belong to exactly one of A, B, C.

$$= \sum n(A) - 2\sum n(A \cap B) + 3\, n(A \cap B \cap C)$$



no. of elements that belong to exactly 2 sets of A, B, C

$$= \sum n(A \cap B) - 3\, n(A \cap B \cap C)$$

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no. of elements that belong to atleast of the sets $A_1, A_2, A_3, \ldots, A_m$

$$\boxed{n(A_1 \cup A_2 \cup A_3 \cup \ldots \cup A_m) = S_1 - S_2 + S_3 - S_4 + \ldots + (-1)^{m-1} S_m}$$

Principle of Inclusion & Exclusion

$S_1 = \sum n(A_1)$

$S_2 = \sum n(A_1 \cap A_2)$

$S_3 = \sum n(A_1 \cap A_2 \cap A_3)$

$n(A_1 \cap A_2 \cap A_3)$

$\vdots$

$S_m = n(A_1 \cap A_2 \cap A_3 \cap \ldots \cap A_m)$

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$\boxed{21-40}$

SC

circles