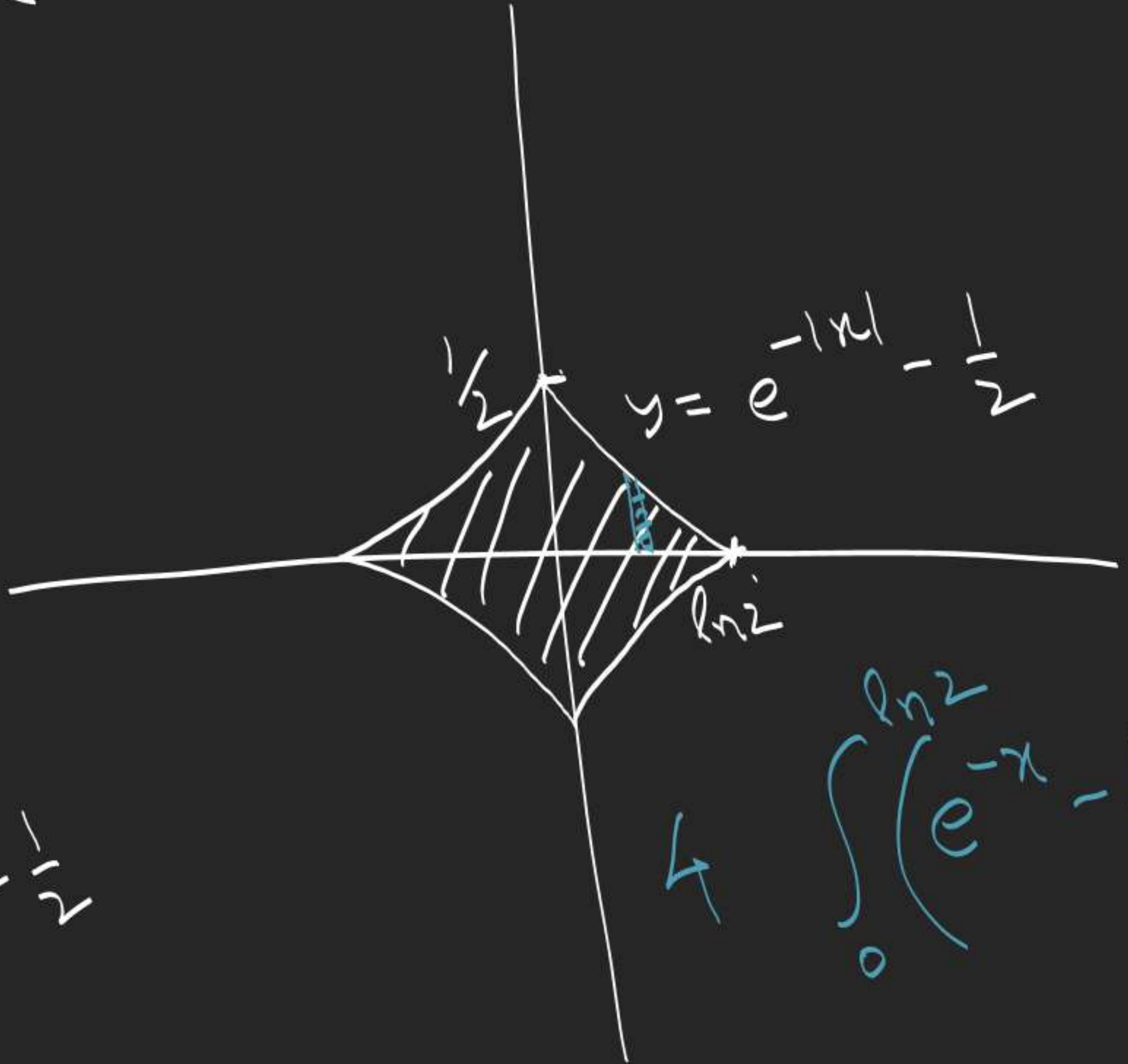
$$|y| \le \underbrace{e^{-|x|} - \frac{1}{2}}_{\ge 0} \qquad -\left(e^{-|x|} - \frac{1}{2}\right) \le y \le e^{-|x|} - \frac{1}{2}$$

$$|y| \le -9$$

$$|y| \le 9$$

$$\Rightarrow \boxed{-9 \le y \le 9}$$




$$e^{-x} - \frac{1}{2}$$

$$4\int_0^{\ln 2} \left(e^{-x} - \frac{1}{2}\right) dx$$

Nishant Jindal

1.

(i) same order

$$P(I \cap I \cap T) = \frac{5}{10} \times \frac{4}{9} \times \frac{5}{8}$$

$$P(I_1)\, P(I_2/I_1)\, P(T/I_1 \cap I_2)$$

$$= \frac{5}{36}$$

(ii) any order.

TII, ITI, IIT

$$(ii) = \frac{5}{36} \times 3$$

$$\boxed{\frac{{}^5C_2\,{}^5C_1}{{}^{10}C_3}}$$

Nishant Jindal

Wed : Ex-3 (Area)

Ex-4 (1-5)

Thurs. (remaining Ex-4)

Vectors (remaining Ex-3, Ex-4)

Saturday

Nishant Jindal

2. (i) $P(T\bar{T} \text{ or } \bar{T}T) = \frac{1}{3}\times\frac{2}{3} + \frac{2}{3}\times\frac{1}{3} = \frac{4}{9}$

(ii) $P(T\bar{T} \text{ or } \bar{T}T \text{ or } TT) = \frac{4}{9} + \frac{1}{3}\times\frac{1}{3} = \frac{5}{9}$

$TT,\ T\bar{T},\ \bar{T}T,\ \bar{T}\bar{T}$

$1 - P(\bar{T}\bar{T})$

$= 1 - \frac{2}{3}\times\frac{2}{3}$

A → 1st day test happened

B → 2nd —"—

(1) $P(A\cap\bar{B} \text{ or } \bar{A}\cap B)$

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

$= \frac{1}{3} + \frac{1}{3} - 2\left(\frac{1}{3}\times\frac{1}{3}\right)$

(2) $P(A\cup B) =$

(3) $1 - P(A\cap B)$

(iii) $P(\bar{T}\bar{T} \text{ or } T\bar{T} \text{ or } \bar{T}T) = \frac{2}{3}\times\frac{2}{3} + \frac{4}{9} = \frac{8}{9}$

$1 - P(TT) = 1 - \frac{1}{3}\times\frac{1}{3} = \frac{8}{9}$

Nishant Jindal

3. $P(A) = P(R \text{ or } \bar{R}\bar{R}\bar{R}R \text{ or } \underbrace{\bar{R} \ldots \bar{R}}_{6} R \text{ or } \ldots)$

$= \frac{1}{6} + \left(\frac{5}{6}\right)^3 \frac{1}{6} + \left(\frac{5}{6}\right)^6 \frac{1}{6} + \ldots$

$= \dfrac{\frac{1}{6}}{1 - \left(\frac{5}{6}\right)^3} = \frac{36}{91}$

$P(A) = p$

$P(B) = \frac{5}{6} \times p$

$P(C) = \frac{5}{6} \times \frac{5}{6} \times p$

$\boxed{p\left(1 + \frac{5}{6} + \frac{25}{36}\right) = 1}$

$P(B) = P(\bar{R}R \text{ or } \bar{R}\bar{R}\bar{R}\bar{R}R \text{ or } \underbrace{\bar{R} \ldots \bar{R}}_{7} R \text{ or } \ldots)$

$= \frac{5}{6}\frac{1}{6} + \left(\frac{5}{6}\right)^4 \frac{1}{6} + \left(\frac{5}{6}\right)^7 \frac{1}{6} + \ldots$

$= \dfrac{\frac{5}{6} \times \frac{1}{6}}{1 - \left(\frac{5}{6}\right)^3} = \frac{30}{91}$

$P(C) = \frac{25}{91}$

Nishant Jindal

4.

$$P\left(5 / 5 \text{ or } 7\right) = \frac{4}{6+4} = \frac{2}{5}.$$

1,4
2,3
3,2
4,1

1,6
2,5
3,4
4,3
5,2
6,1

$$P(5) + P(\bar{5} \cap \bar{7}) P(5) + \left(P(\bar{5} \cap \bar{7})\right)^2 P(5) + \cdots$$

$$= \frac{4}{36} + \frac{26}{36} \times \frac{4}{36} + \left(\frac{26}{36}\right)^2 \frac{4}{36} + \cdots \infty$$

$$= \frac{\frac{4}{36}}{1 - \frac{26}{36}}$$

Nishant Jindal

5.


$$p = \frac{n(E_2)}{n(A\cup B\cup C)} = \frac{25}{105} = \frac{5}{21}$$

$$\sum n(A\cap B) = 55 \checkmark$$

$$n(E_1) = 70 = \overset{150}{\sum n(A)} - 2\sum n(A\cap B) + 3\,\overset{10}{n(A\cap B\cap C)}$$

$$n(E_2) = \sum n(A\cap B) - 3\,n(A\cap B\cap C) = 55 - 3(10) = 25$$

$$n(E_2) = \frac{40+50+60-70-3(10)}{2} = 25$$

$$n(A\cup B\cup C) = \sum n(A) - \sum n(A\cap B) + n(A\cap B\cap C) = 150 - 55 + 10 = \underline{\underline{105}}$$

$$n(A\cup B\cup C) = n(E_1) + n(E_2) + n(E_3) = 70 + 25 + 10 = 105$$

Nishant Jindal

6. For 3 events A, B and C

P(exactly one of the events A or B occurs)

= P( —"— B or C —"— )

= P( —"— C or A —"— )

= p

$p = P(A) + P(B) - 2P(A\cap B)$

$p = P(B) + P(C) - 2P(B\cap C)$

$p = P(C) + P(A) - 2P(C\cap A)$

$\frac{3p}{2} = \sum P(A) - \sum P(A\cap B)$

$P(A\cap B\cap C) = p^2$

$P(A\cup B\cup C) = 1 = \frac{3p}{2} + p^2$

P(all the 3 events occur simultaneously) = $p^2$.

If A, B, C are exhaustive, find p.

$\boxed{p = \frac{1}{2}}$