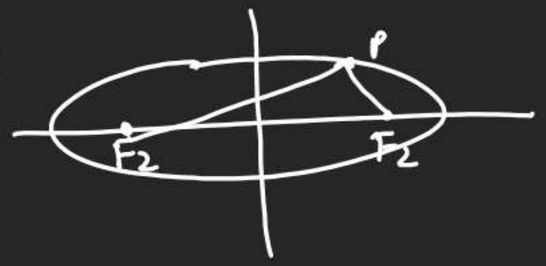
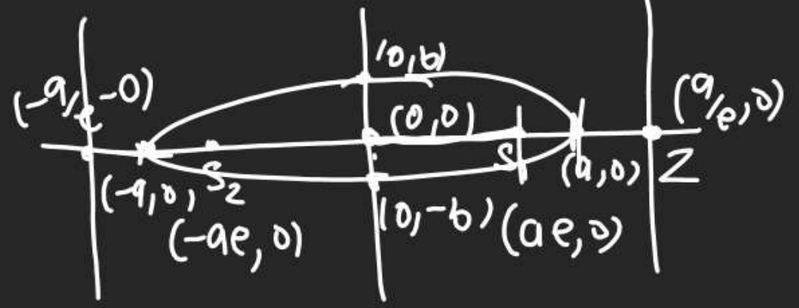
Nishant Jindal

1)



$PF_1 + PF_2 = 2a > 2c$



$SP = ePM$

$a^2 - c^2 = b^2$

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$e = \frac{c}{a}$

$1 - e^2 = \frac{b^2}{a^2}$

RK.

1) Distance of Focus from centre $= ae$

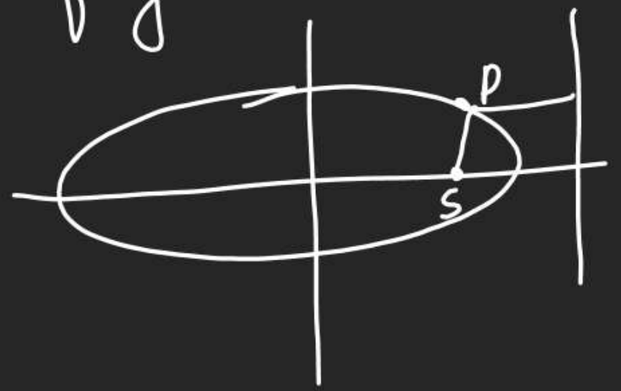
2) Distance betn both foci $= 2ae$

Major Axis $= 2a$. & Minor Axis $= 2b$.

distance of Focus from Vertex $= a - ae$

distance of focus from directrix $= SZ = \frac{a}{e} - ae$

* Focal Radii of any Pt. $SP = a - ex_1$ /



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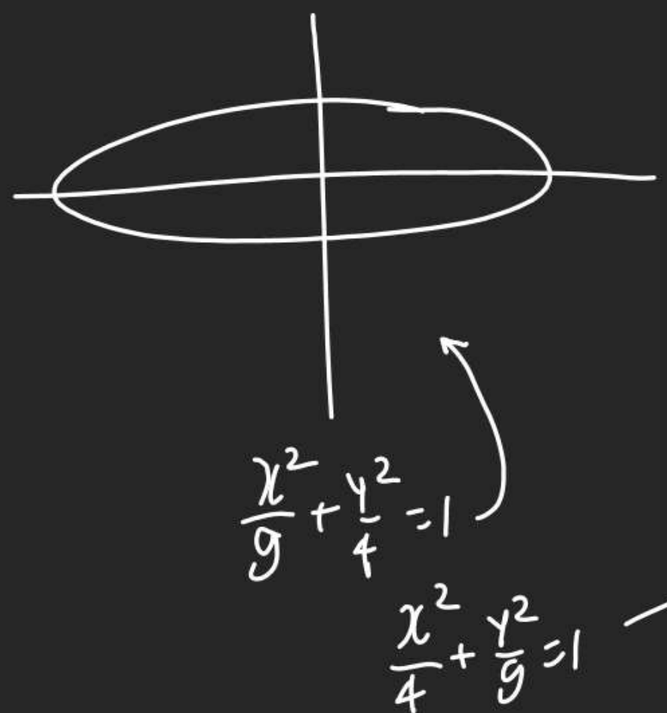
2 Ellipse Possible.

depends on a & b.

$a > b$.

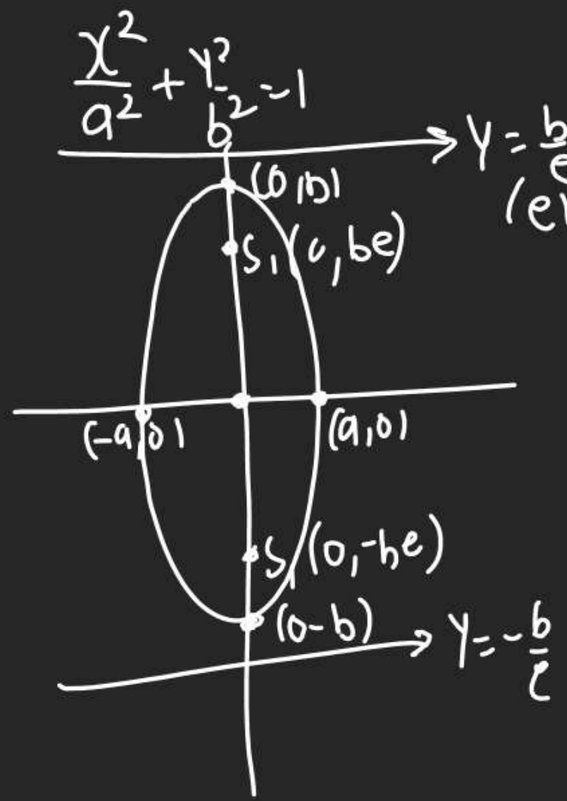


$\frac{x^2}{9} + \frac{y^2}{4} = 1$

$\frac{x^2}{4} + \frac{y^2}{9} = 1$

$a < b$.

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$



Centre = (0,0)

Minor Axis = 2a

Major Axis = 2b.

Foci = (0, be) & (0, -be)

Directrix = $Y = \frac{b}{e}$ & $Y = -\frac{b}{e}$

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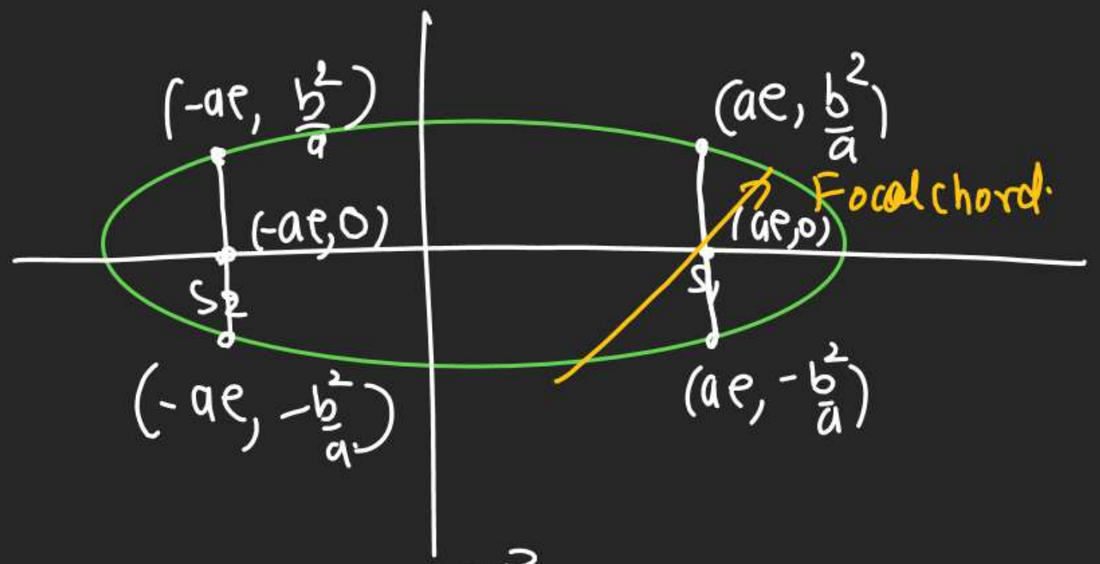
L.R.



$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ $\quad$ LLR: $\frac{2b^2}{a}$

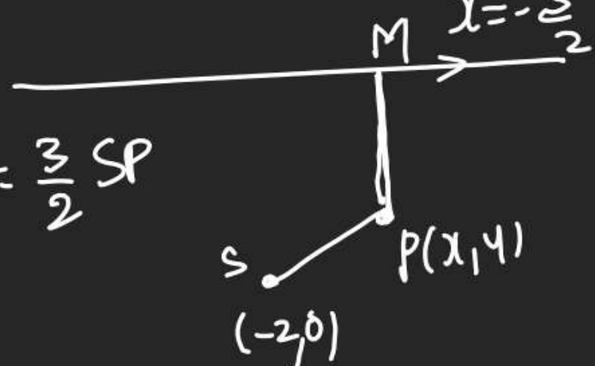
$x=ae$ put

$\frac{a^2e^2}{a^2}+\frac{y^2}{b^2}=1$

$\frac{y^2}{b^2}=1-e^2=\frac{b^2}{a^2}$

$y^2=\frac{b^4}{a^2} \Rightarrow y=\frac{b^2}{a}, -\frac{b^2}{a}$

Q1 A pt is moving such that its distance from $(-2,0)$ is $\frac{3}{2}$ times its distance from $x=-\frac{3}{2}$ find locus.



$\frac{SP}{PM}=\frac{2}{3}$

$SP=\frac{3}{2}PM$

$\frac{SP}{PM}=\frac{3}{2}$

$\sqrt{(x+2)^2+y^2}=\frac{3}{2}\frac{|2x+3|}{\sqrt{2^2+0^2}}$

$16x^2+64+64x+4y^2=36x^2+81+108x$

$20x^2-4y^2+44x+17=0$

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Q $(5x-1)^2+(5y-2)^2 = (\lambda^2-2\lambda+1)(3x+4y-1)^2$

is Ellipse find λ?

distance formulae के Sq" जैसा $\Rightarrow SP^2$ | e^2 जैसा | PM^2 होना चाहिए

$SP^2 = e^2 PM^2$

$\left(x-\frac{1}{5}\right)^2+\left(y-\frac{2}{5}\right)^2 = (\lambda-1)^2\left(\frac{3x+4y-1}{\sqrt{25}}\right)^2$ → Perfect 2 ll dist. formula

$e = |\lambda-1| < 1$

$-1 < \lambda-1 < 1$

$0 < \lambda < 2 \Rightarrow \lambda \in (0,2)$ Ans

Q3 Find Eq" of Ellipse whose ecc. is $\frac{1}{2}$ & focii $(\pm 1, 0)$?

$e = 1/2$

$1-e^2 = \frac{b^2}{a^2}$

$1-\frac{1}{4} = \frac{b^2}{4}$

$\frac{3}{4} = \frac{b^2}{4}$

$b^2 = 3$

$(-ae, 0)$ $(ae, 0)$

$(-1, 0)$ $(1, 0)$

$2ae = 2$

$a \times \frac{1}{2} = 1$

$a = 2$

E: $\frac{x^2}{4}+\frac{y^2}{3} = 1$ Ans

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Q4 Find Eqn of Ellipse Whose

Length of Minor Axis is equal to distance betn focii & LLR = 10.

① $2b = 2ae$

② $\frac{2b^2}{a} = 10^5$

$b^2 = 5a$

$b^2 = 50$

$\frac{x^2}{100} + \frac{y^2}{50} = 1$

③ $1 - e^2 = \frac{b^2}{a^2} \Rightarrow a^2 - a^2e^2 = b^2$

$a^2 - b^2 = b^2$

$2b^2 = a^2$

$a^2 = 10a \Rightarrow a = 0, 10$ ✗

Q5 Eqn of Ellipse whose

Focus $(-1, 1)$, ecc $= \frac{1}{2}$

Dir $\Rightarrow x - y + 3 = 0$

$S = (-1, 1)$ & $P = (x, y)$

$SP = ePM$

$\sqrt{(x+1)^2 + (y-1)^2} = \frac{1}{2} \frac{|x - y + 3|}{\sqrt{1^2 + 1^2}}$

$8x^2 + 16x + 8 + 8y^2 - 16y + 16 = x^2 + y^2 + y - 2xy + 6x - 6y$

$7x^2 + 7y^2 + 2xy - 10y + 10x + 7 = 0$

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Q Ecc. of $9x^2+5y^2-30y=0$ (Ellipse)

$9x^2+5(y^2-6y)=0$

$9x^2+5(y^2-6y+9)=45$

$9x^2+5(y-3)^2=45$

$\frac{x^2}{5}+\frac{(y-3)^2}{9}=1$ E.

$a^2=5, b^2=9$

$a<b$

Normal Ellipse $\Rightarrow 1-e^2=\frac{b^2}{a^2}$

Ellipse $\Rightarrow 1-e^2=\frac{a^2}{b^2}$

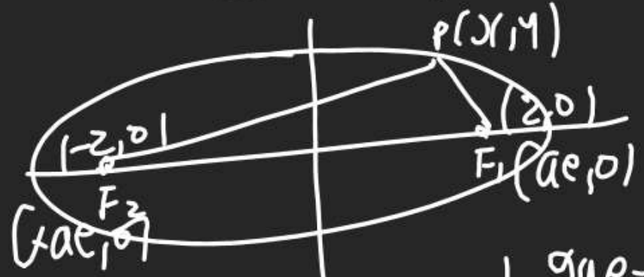
$1-e^2=\frac{5}{9} \Rightarrow e^2=\frac{4}{9} \Rightarrow \boxed{e=\frac{2}{3}}$

Q7 Find Locus of a Pt.

Whose sum of distance

from 2 pts (2,0) & (-2,0)

remain 6 always.



$PF_1+PF_2=2a$

$2a=6$

$a=3$

$2ae=4$

$ae=2$

$e=\frac{2}{3}$

$1-e^2=\frac{b^2}{a^2} \Rightarrow 1-\frac{4}{9}=\frac{b^2}{9}$

$b^2=5$

$\frac{x^2}{9}+\frac{y^2}{5}=1$

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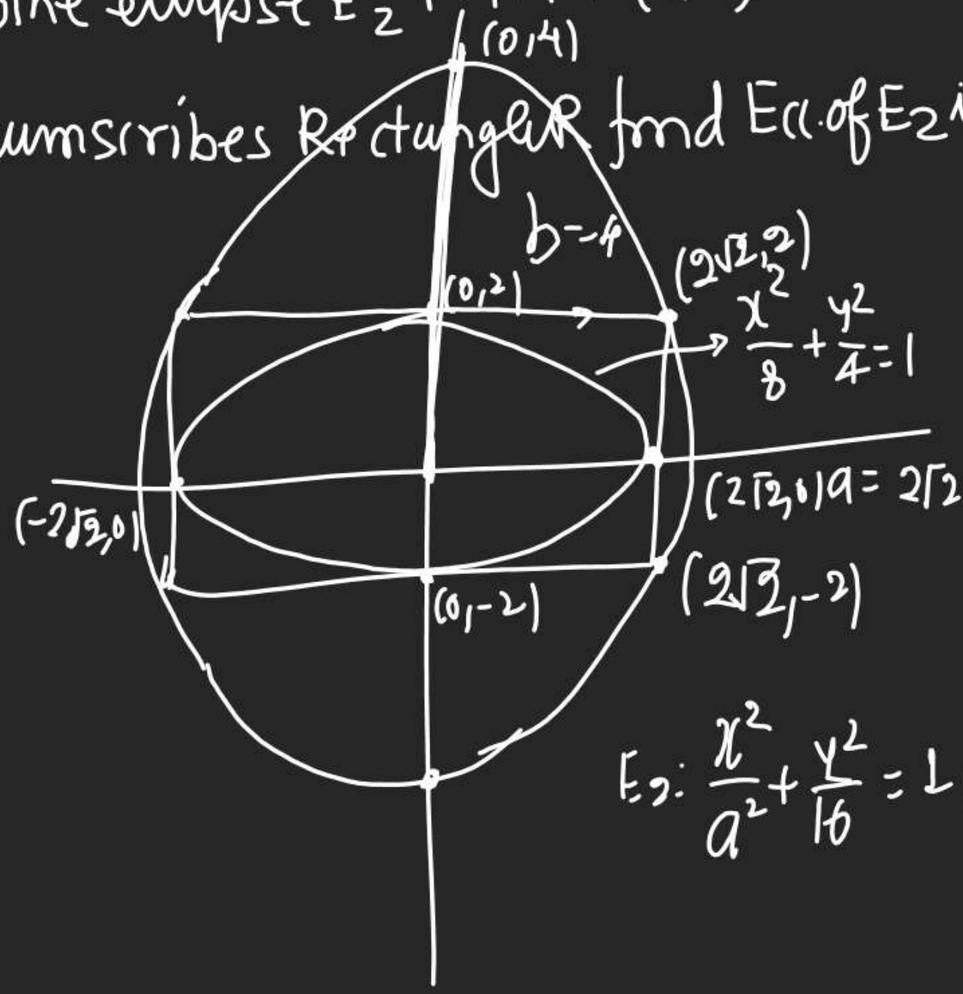
Q8 $E: \frac{x^2}{8}+\frac{y^2}{4}=1$ is inscribed in a Rectangle R whose sides are $\parallel^{rs}$ to co-axes another ellipse E_2 P.T. Pt. $(0,4)$ Circumscribes Rectangle R find Ecc. of E_2 is.



$E_2: \frac{x^2}{a^2}+\frac{y^2}{16}=1$ P.T. $(2\sqrt{2},2)$

$\frac{8}{a^2}+\frac{4}{16}=1$

$\frac{8}{a^2}=\frac{3}{4}$

$a^2=\frac{32}{3}$

Ecc. $1-e^2=\frac{a^2}{b^2}$

$1-e^2=\frac{32}{3\times 16}$

$\frac{1}{3}=e^2$

$e=\frac{1}{\sqrt{3}}$

Q Sol Bi Pdf ST-10

Q9 $E: \frac{x^2}{9}+\frac{y^2}{4}=1$.

& P. $(1,2)$, Q $(2,1)$

find Position of Pt.

2)

$E: \frac{x^2}{9}+\frac{y^2}{4}-1=0$

$E(1,2)=\frac{1}{9}+\frac{4}{4}-1>0$ outside Ellipse

$E(2,1)=\frac{4}{9}+\frac{1}{4}-1<0$

(2,1) is Inside Ellipse

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Q Centre of

$f(x,y) \quad x^2+24xy-6y^2+28x+36y+10=0$

is

for Centre :→ (y const.) $\frac{\partial f}{\partial x} = 2x+24y\cdot 1-0+28+0+0=0$

$x+12y+14=0 \rightarrow A \times 2$

(x const) $\frac{\partial f}{\partial y} = 0+24x\cdot 1-12y+0+36+0=0$

$2x-y+3=0 \rightarrow B.$

$2x+24y+28=0$

$-25y=25$

$y=-1$

$x-12+14=0$

$x=-2$

$\therefore (-2,-1)$ is centre

XXXII

Q 1-8