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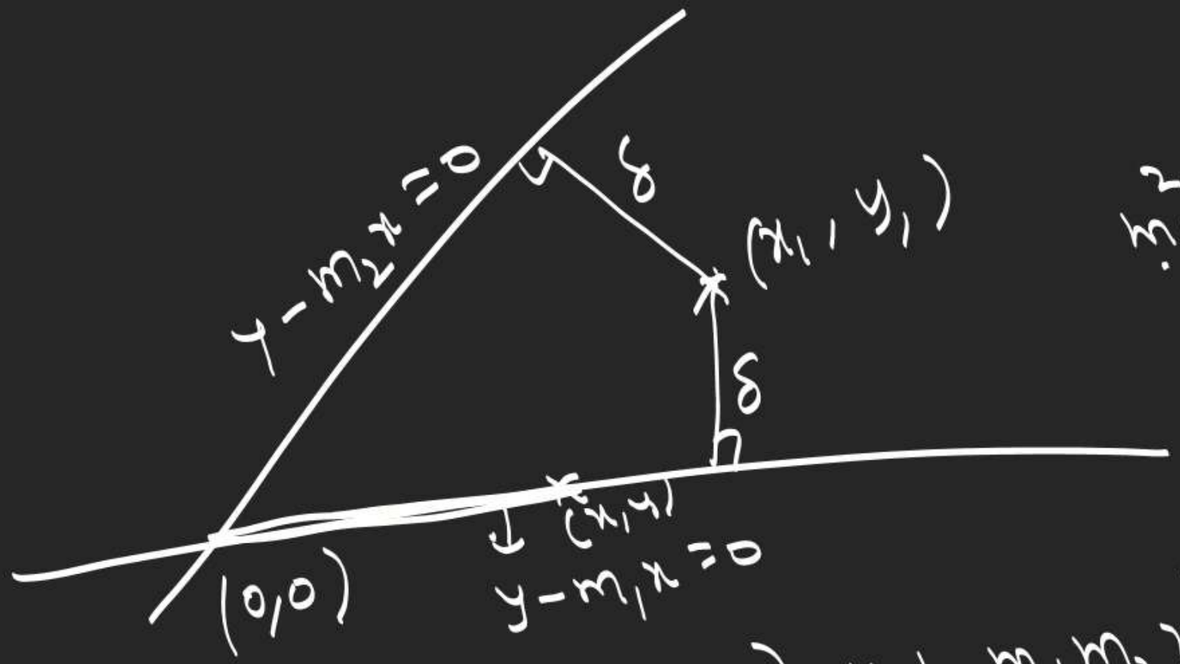

$$\frac{m^2 - 2x_1 y_1 m + y_1^2 - \delta^2}{x_1^2 - \delta^2} = (m - m_1)(m - m_2)$$

$$y^2 - (m_1 + m_2)xy + m_1 m_2 x^2 = 0$$

$$(y_1 - mx_1)^2 = \delta^2 (1 + m^2)$$

$$(x_1^2 - \delta^2)m^2 - 2x_1 y_1 m + y_1^2 - \delta^2 = 0$$

m_1 m_2

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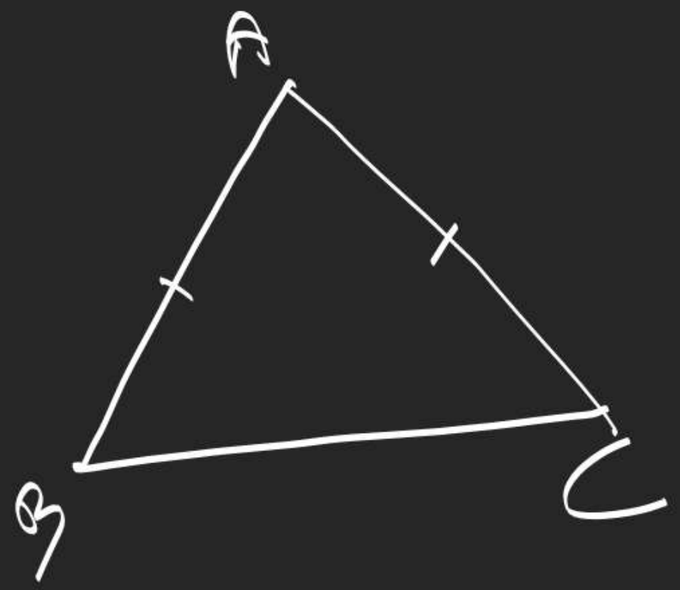

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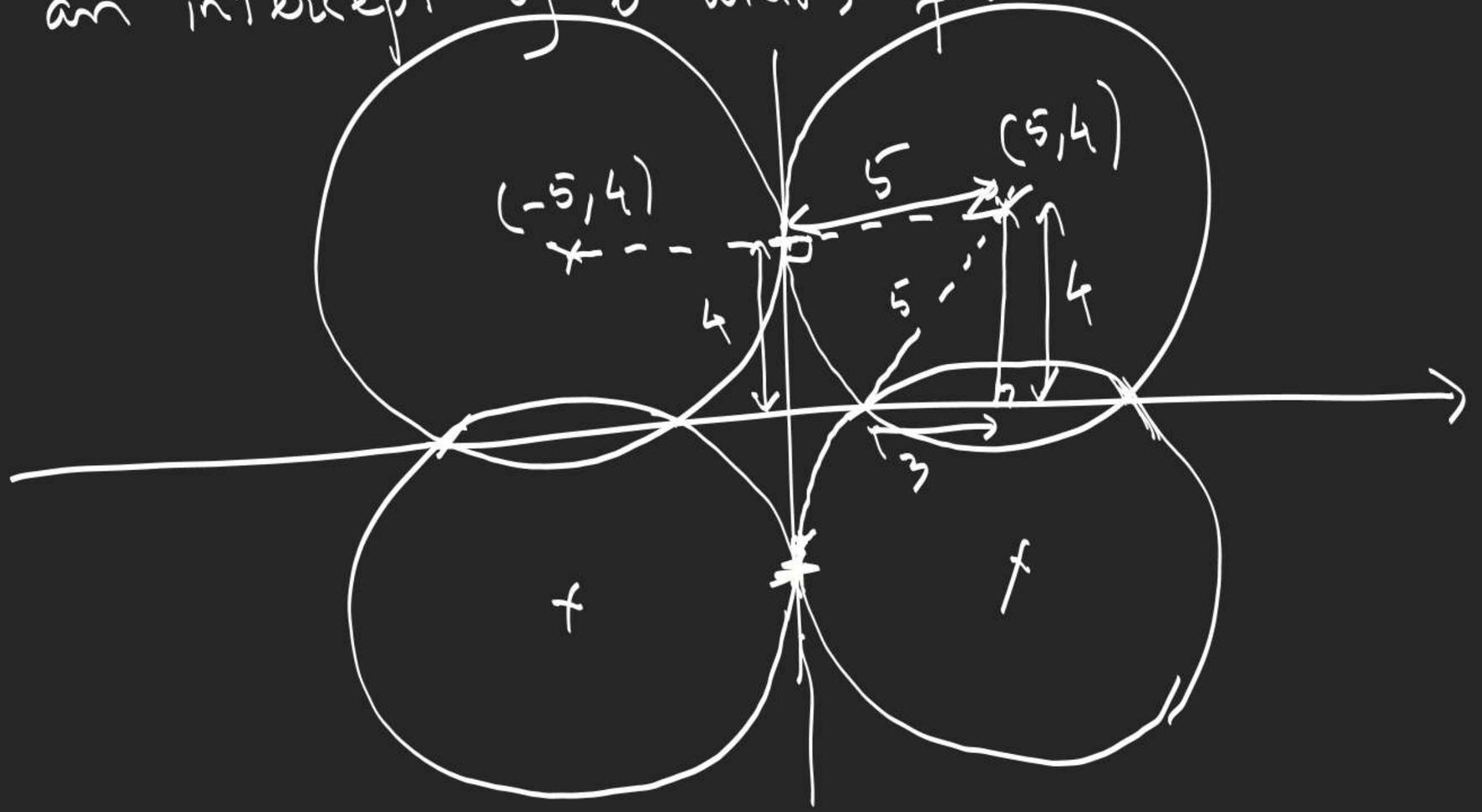
1: Find the eqn. of circle which touches y-axis at a distance of 4 units from origin and cuts off an intercept of 6 units from x-axis.



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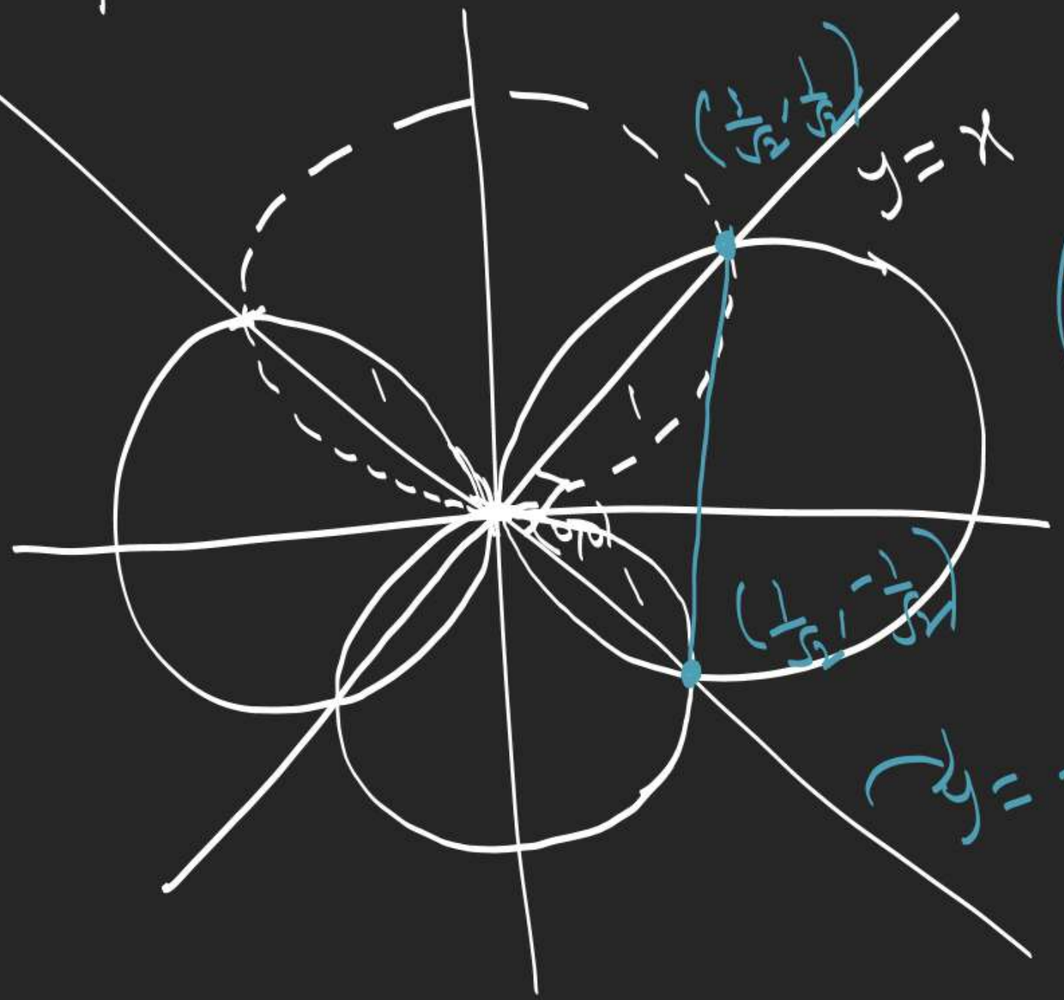
2: Find the eqn. of circle passing thru origin cutting off intercepts equaln to unity on the lines $y^2 - x^2 = 0$.



$$\left(x - \frac{1}{\sqrt{2}}\right)^2 + \left(y - \frac{1}{\sqrt{2}}\right)\left(y + \frac{1}{\sqrt{2}}\right) = 0$$

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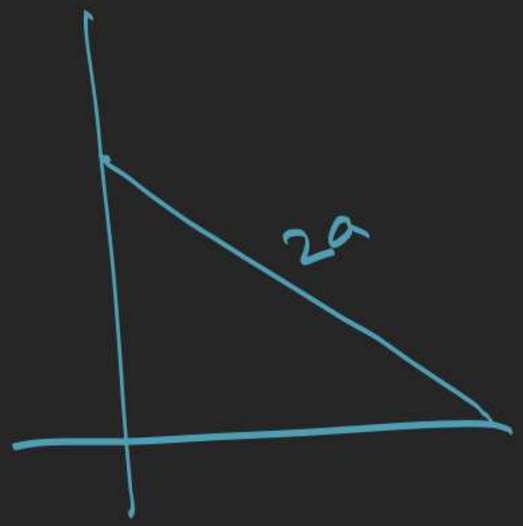
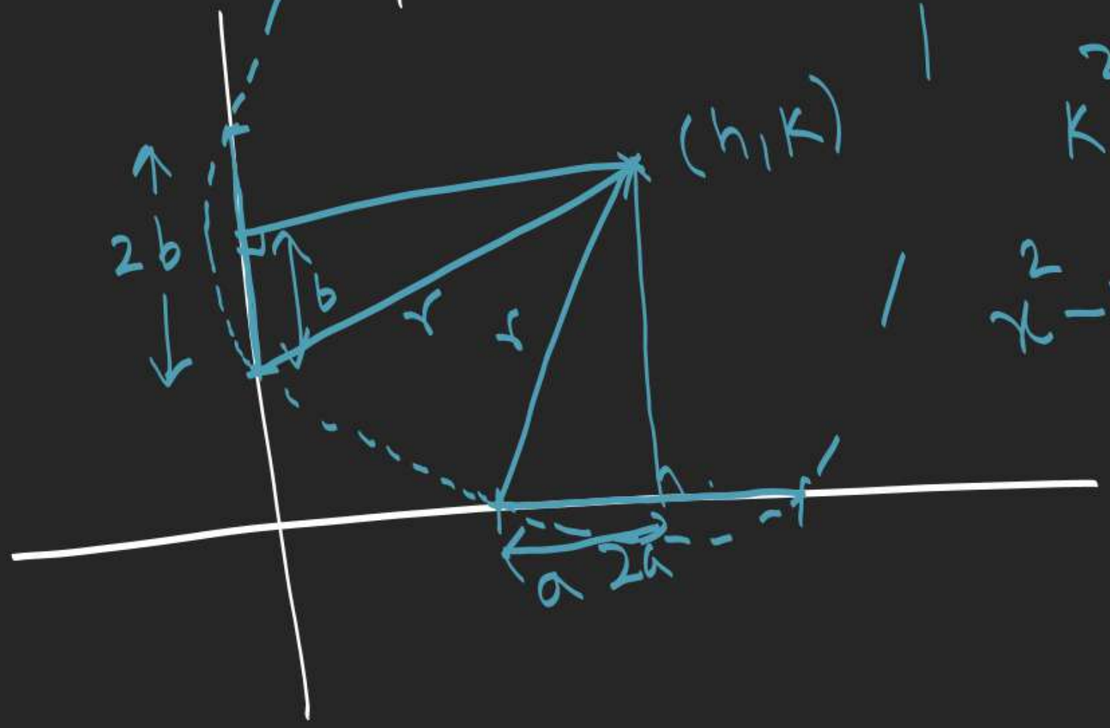
3. Two rods whose lengths are $2a$ and $2b$ slide along coordinate axes in such a way that their extremeties are always concyclic. Find the locus of centre of circle.





$$k^2 + a^2 = h^2 + b^2$$

$$x^2 - y^2 = a^2 - b^2$$

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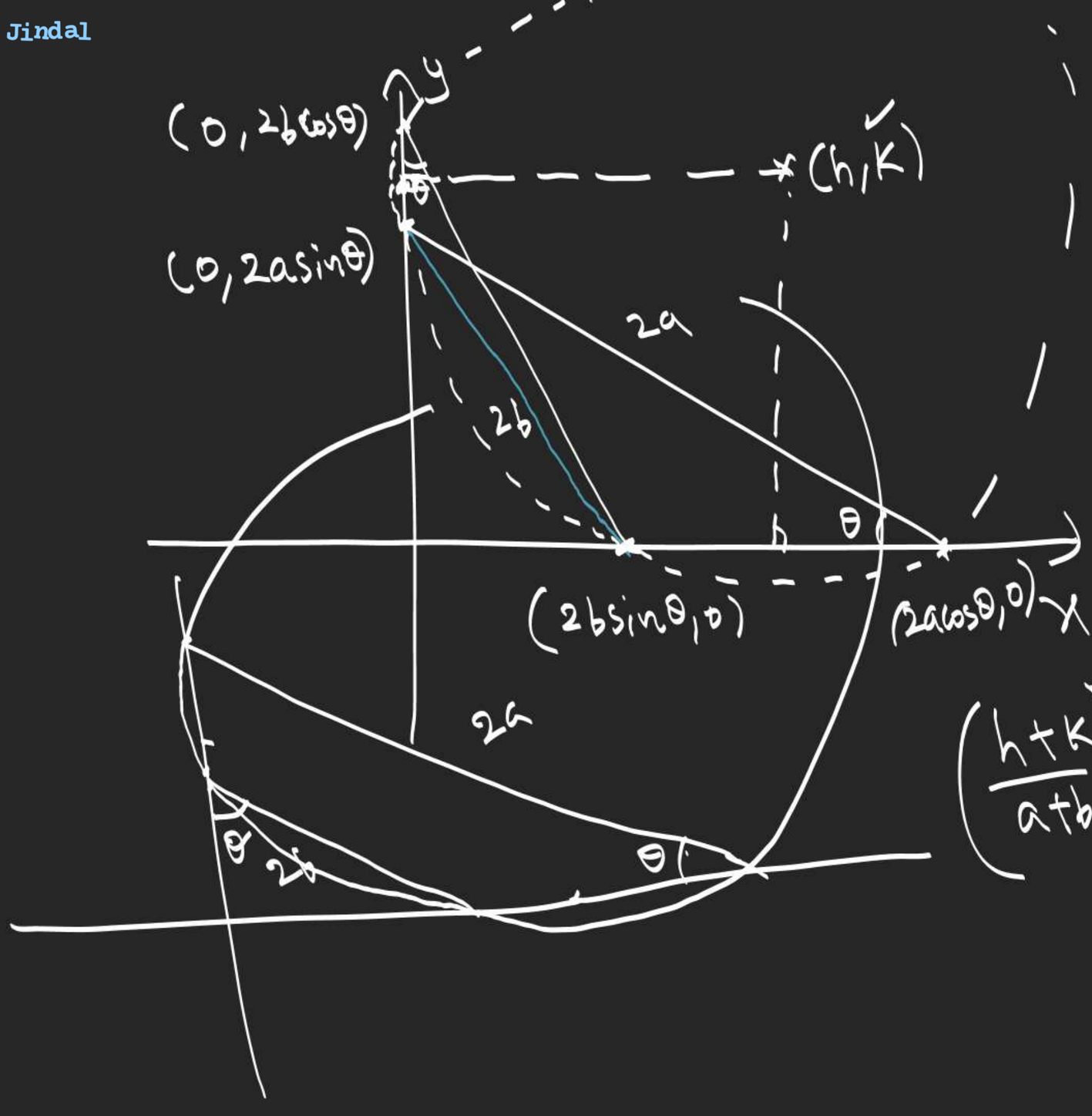

$$h = b\sin\theta + a\cos\theta$$

$$k = a\sin\theta + b\cos\theta$$

$$h+k = (a+b)(\sin\theta+\cos\theta)$$

$$h-k = (b-a)(\sin\theta-\cos\theta)$$

$$\left(\frac{h+k}{a+b}\right)^2 + \left(\frac{h-k}{b-a}\right)^2 = 2$$

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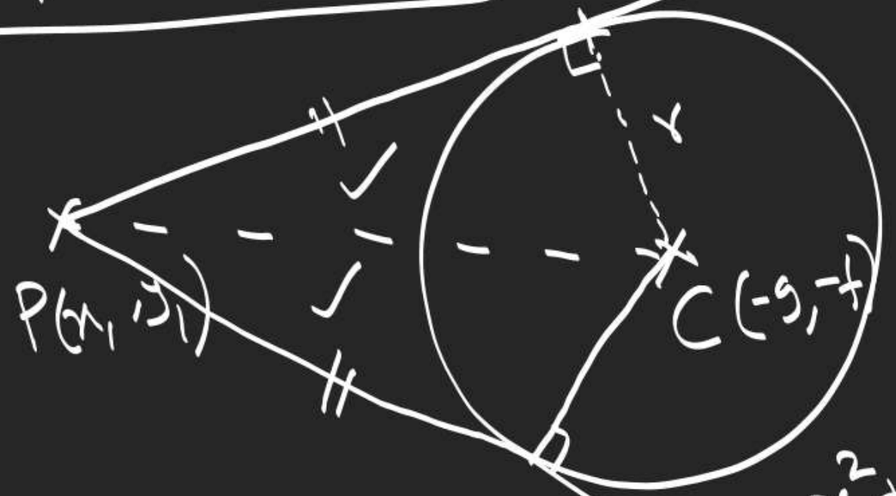
Length of tangent from a point to a circle $= \sqrt{S_1}$

$S_1 = x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c$



$PT^2 = (CP)^2 - r^2$

$= (x_1+g)^2 + (y_1+f)^2 - (g^2+f^2-c)$

$= x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c$

$x^2 + y^2 + 2gx + 2fy + c = 0$

$\therefore S = x^2 + y^2 + 2gx + 2fy + c$

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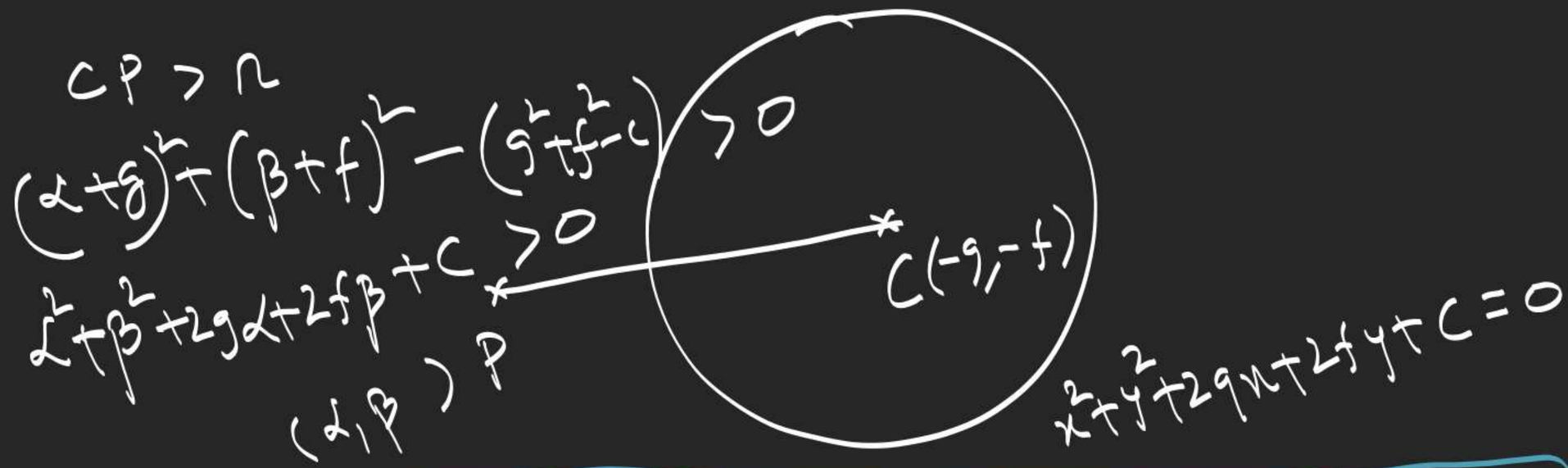
Position of a point w.r.t. Circle



$S_1 > 0 \Rightarrow$ point 'P' lies outside the circle

$S_1 < 0 \Rightarrow$ point 'P' lies inside the circle