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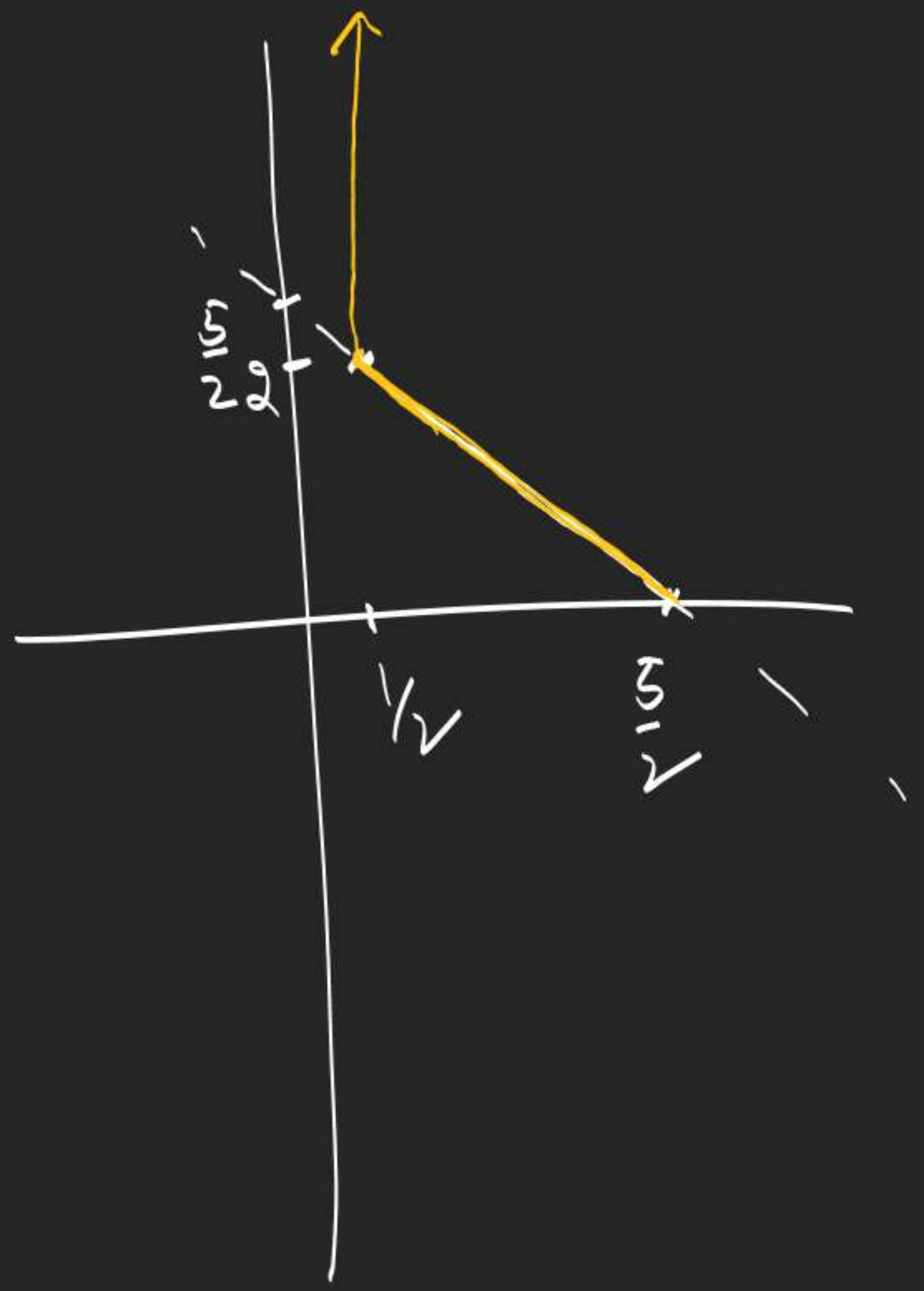
$$x+y = |x-3|+|y-2|$$

$0 \leq x \leq 3,\ 0 \leq y \leq 2$ $\quad x+y=\frac{5}{2}$

$0 \leq x \leq 3,\ y > 2$ $\quad x=\frac{1}{2}$

$x > 3,\ 0 \leq y \leq 2$ $\quad y=-\frac{1}{2}$ ✗

$x > 3,\ y > 2$ $\quad 0=-5$ ✗



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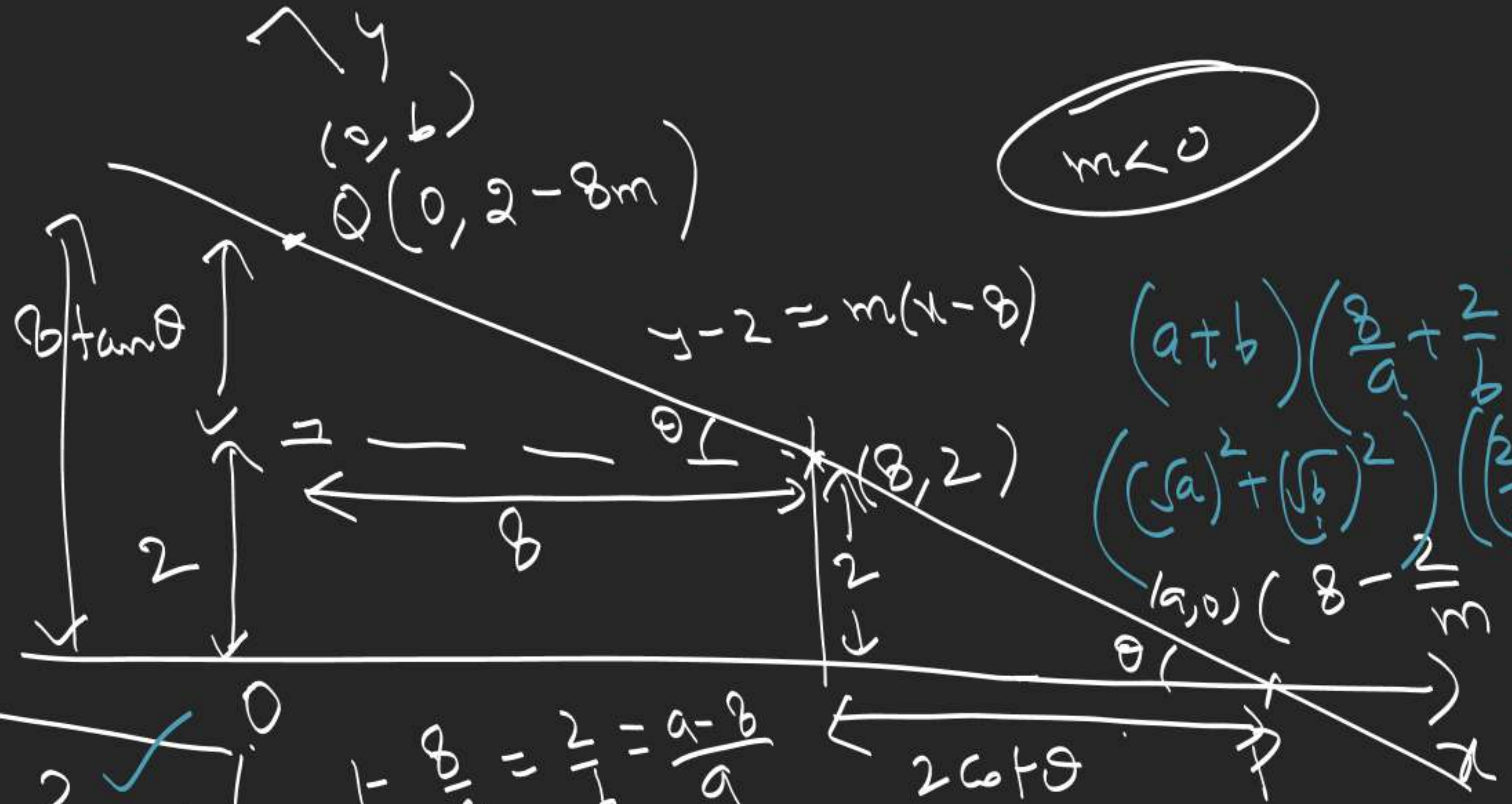

$m<0$

$$(a+b)\left(\frac{8}{a}+\frac{2}{b}\right)=a+b$$

$$\left((\sqrt{a})^2+(\sqrt{b})^2\right)\left(\left(\frac{2\sqrt2}{\sqrt a}\right)^2+\left(\frac{\sqrt2}{\sqrt b}\right)^2\right)\geq\left(2\sqrt2+\sqrt2\right)^2$$

$$=18$$

Eq. if

$$\frac{a}{2\sqrt2}=\frac{b}{\sqrt2}$$

$$\boxed{\frac{8}{a}+\frac{2}{b}=1}$$

$$1-\frac{8}{a}=\frac{2}{b}=\frac{a-8}{a}$$

$$OP+OQ=8-\frac{2}{m}+2-8m$$

$$=10+\left(\left(-\frac{2}{m}\right)+(-8m)\right)\geq 10+2(4)=18$$

$$\geq 2\sqrt{(-2)(-8)}$$

$$-\frac{2}{m}=-8m$$

$$m^2=\frac{1}{4}$$

$$\frac{d}{da}(\ )=0$$

$a+b=?$

$$=a+\frac{2a-16+16}{a-8}$$

$$=10+\boxed{\frac{16}{a-8}+(a-8)}=18$$

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Cauchy's Inequality

$$\left(a_1^2+a_2^2+a_3^2+\dots+a_n^2\right)\left(b_1^2+b_2^2+b_3^2+\dots+b_n^2\right) \geq \left(a_1b_1+a_2b_2+\dots+a_nb_n\right)^2$$

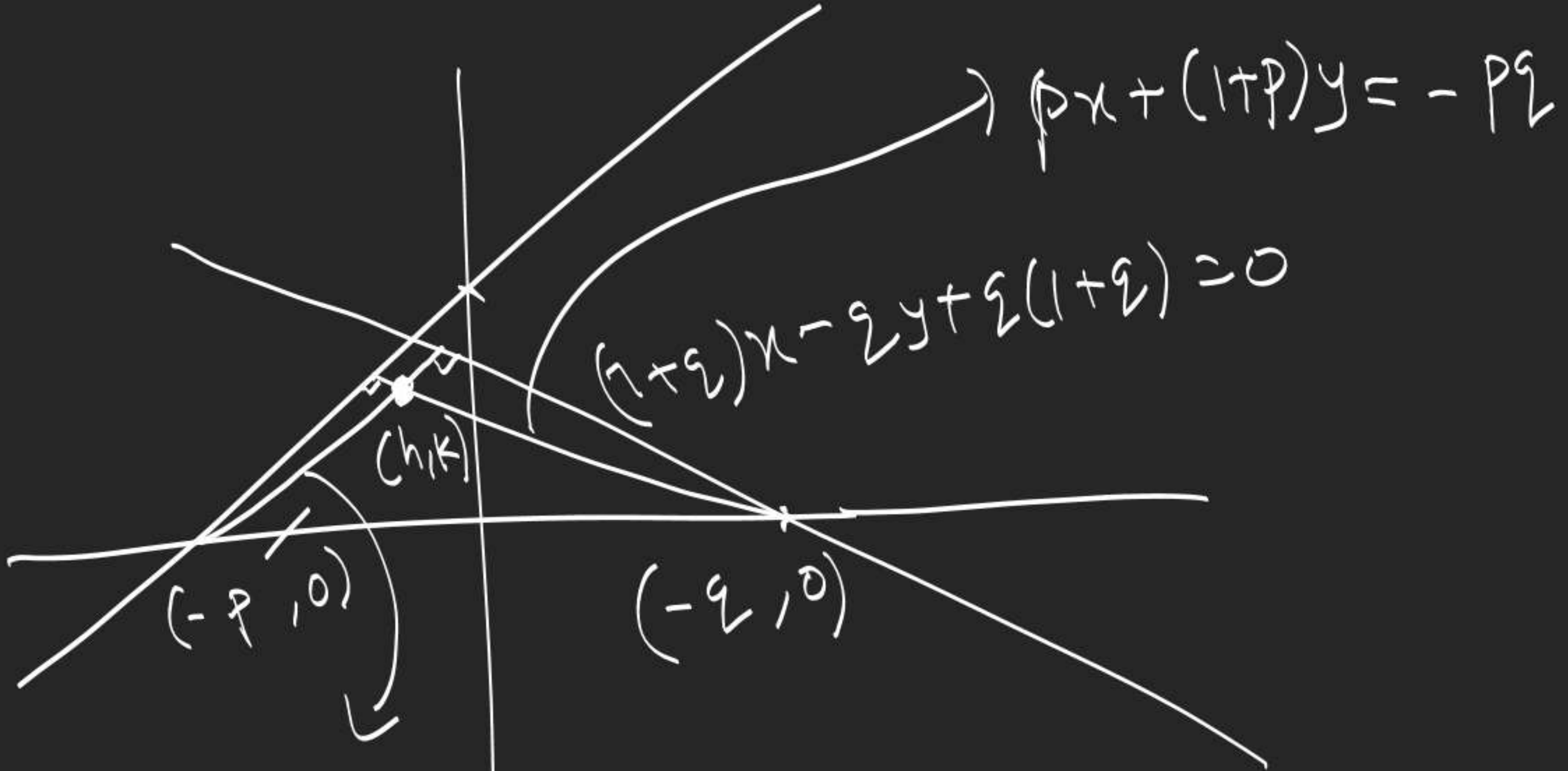
Equality holds if $\frac{a_1}{b_1} = \frac{a_2}{b_2} = \frac{a_3}{b_3} = \dots = \frac{a_n}{b_n}$.

$a_i + x b_i = 0$

$$(a_1+xb_1)^2 + (a_2+xb_2)^2 + \dots + (a_n+xb_n)^2 \geq 0$$

$$(b_1^2+b_2^2+\dots+b_n^2)x^2 + 2(a_1b_1+a_2b_2+\dots+a_nb_n)x + (a_1^2+a_2^2+\dots+a_n^2) \geq 0 \quad \forall x \in R.$$

$$D \leq 0 \Rightarrow \left(\sum a_i b_i\right)^2 \leq \left(\sum b_i^2\right)\left(\sum a_i^2\right)$$



$$qx+(1+q)y=-pq \Rightarrow qh+(1+q)k=-pq.$$

$$ph+(1+p)k=-pq.$$

$$(q-p)h+(q-p)k=0$$

$$\boxed{h+k=0}$$

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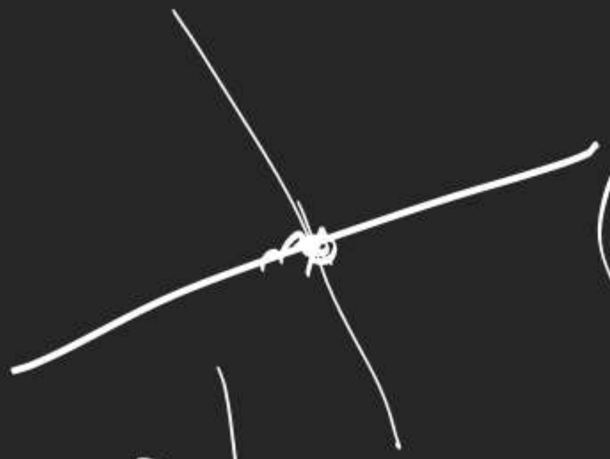
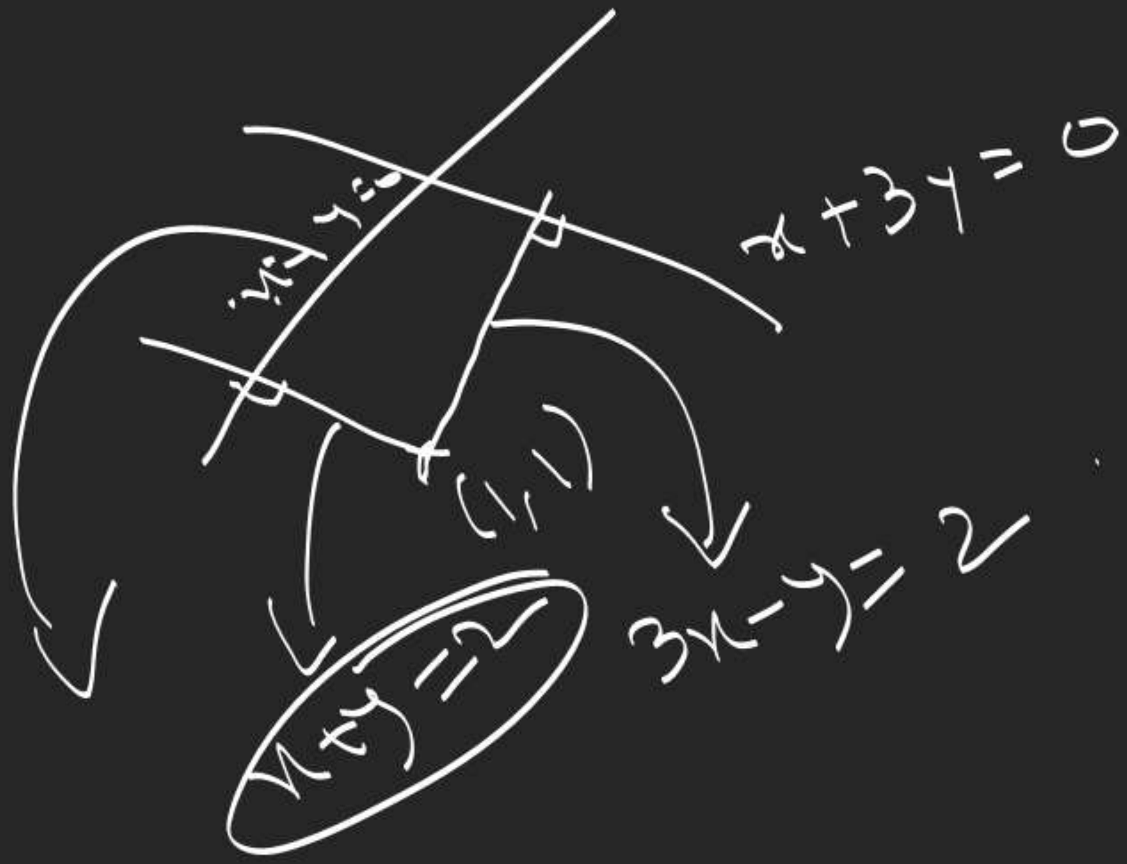
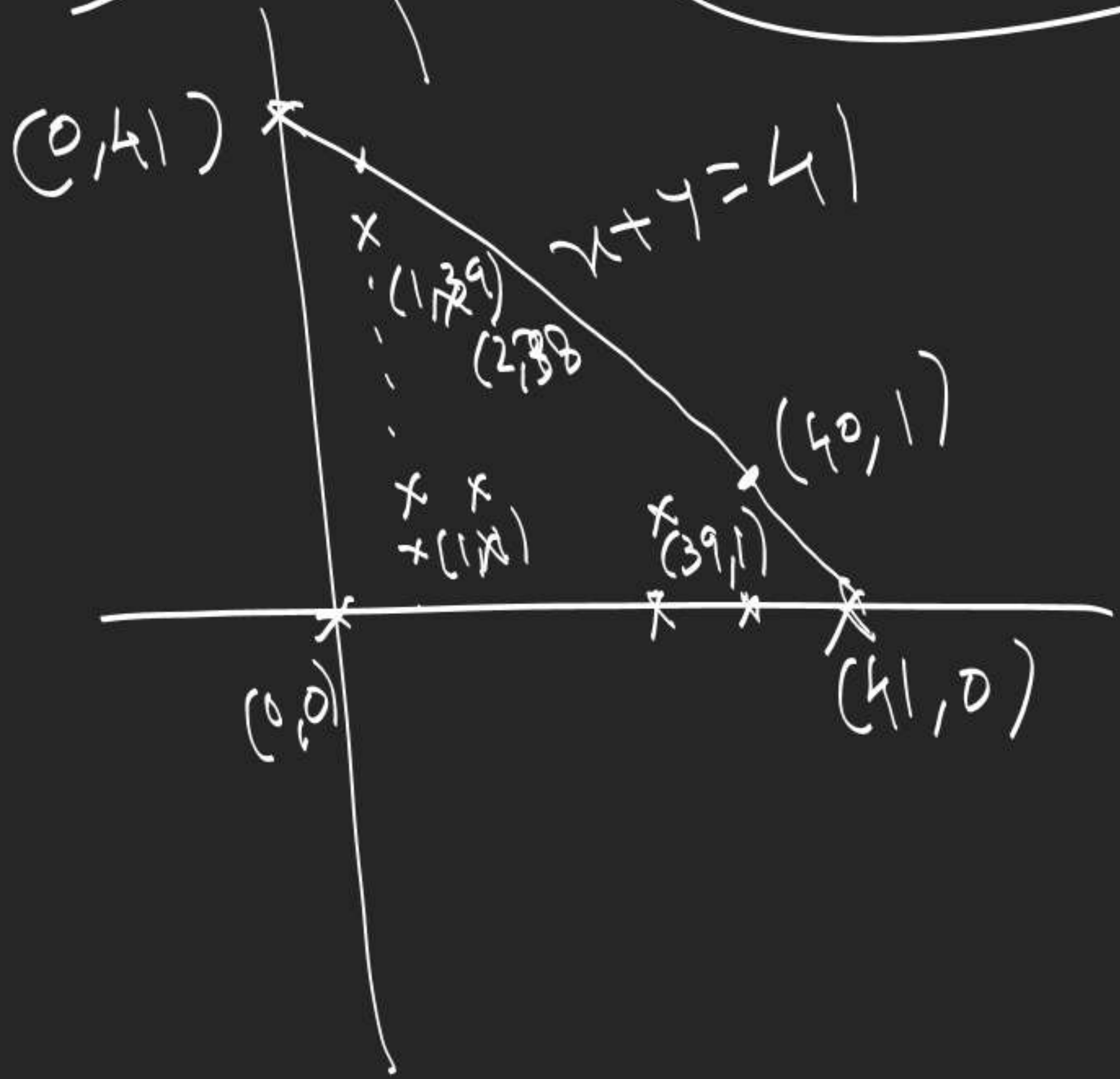
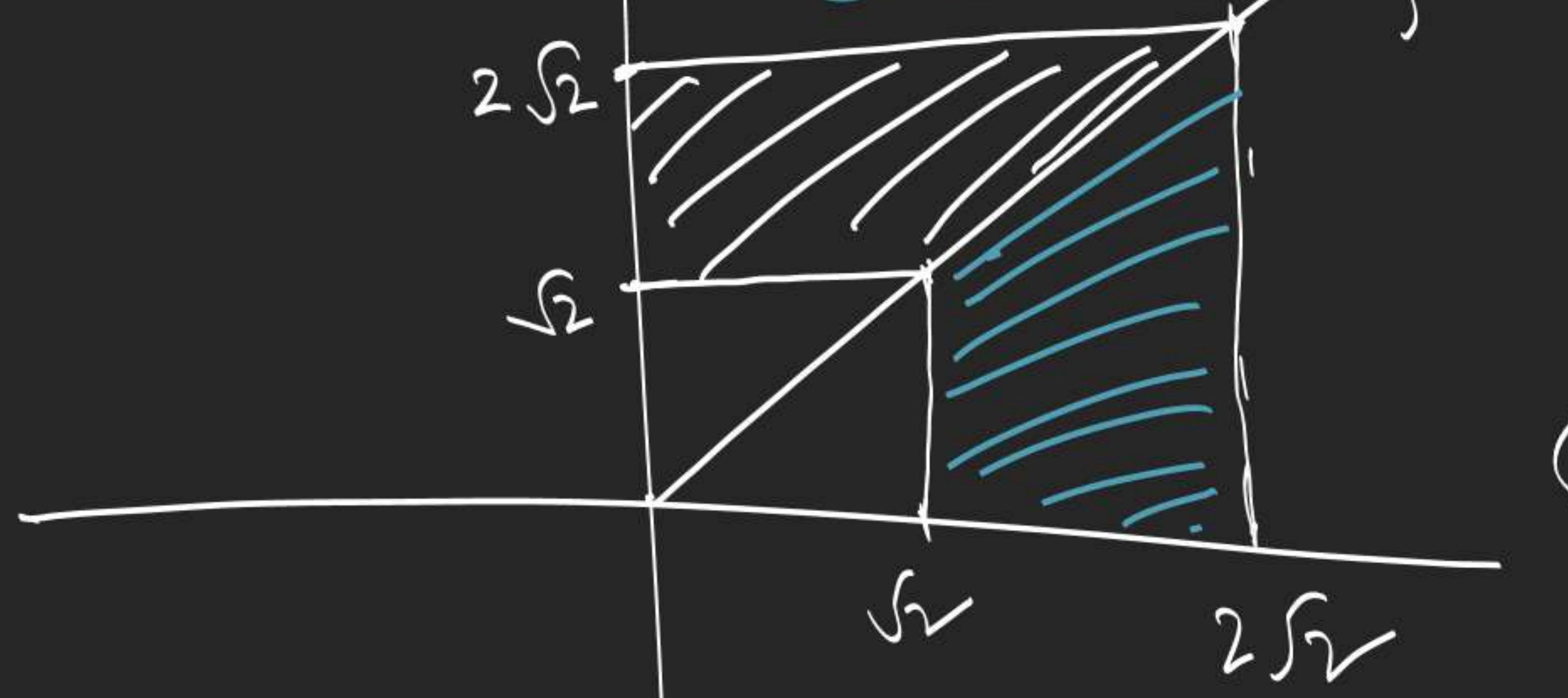


$39+38+\dots+1$





$$(2\sqrt{2})^2 - (\sqrt{2})^2 = \boxed{6}$$



$1(y-x) > 0$

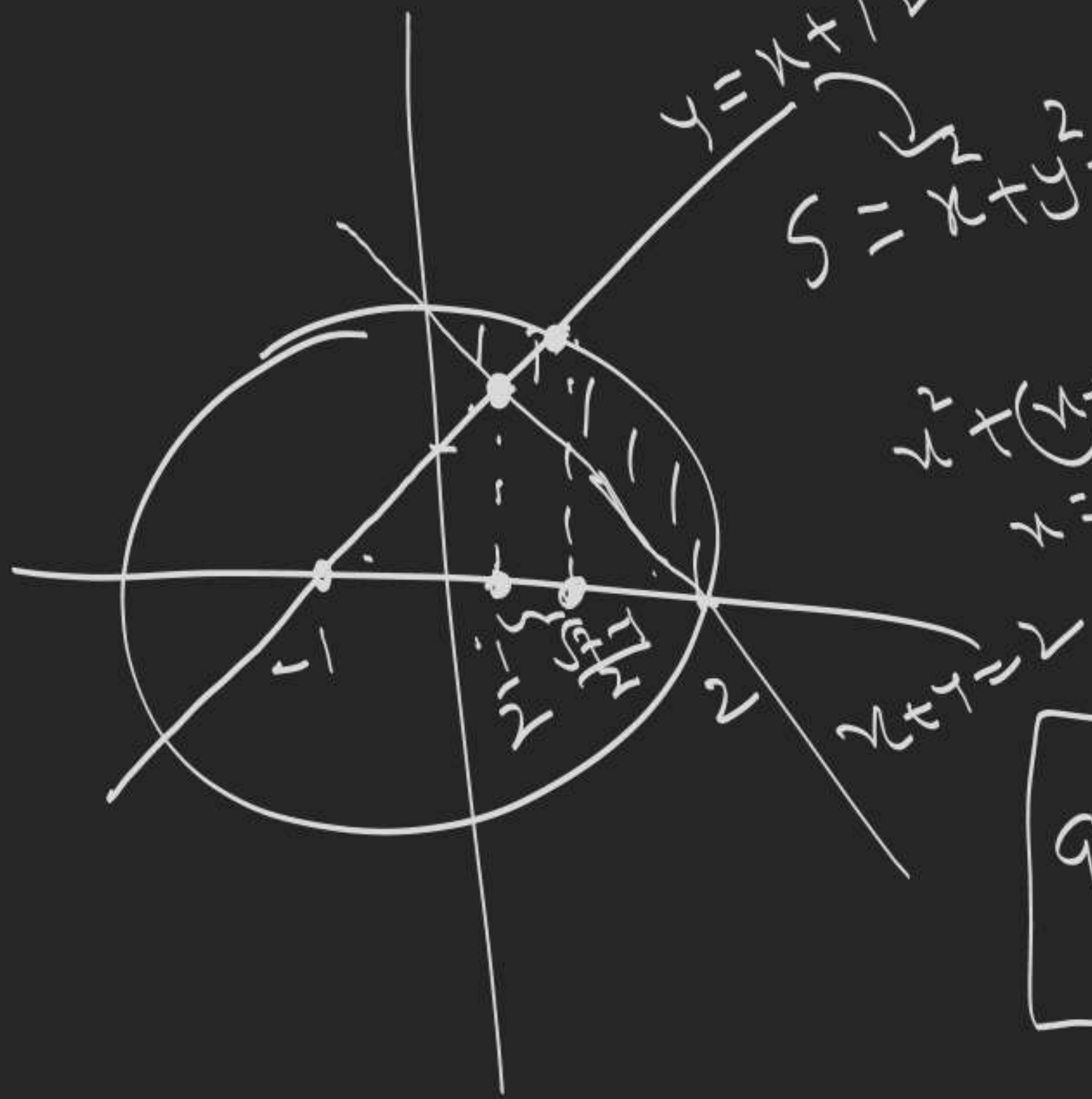
$1(y-x) < 0$

$$2\sqrt{2} \le |y-x| + y + x \le 4\sqrt{2}$$

$y - x \geq 0$ ✓ $\Rightarrow 2\sqrt{2} \le y - x + y + x \le 4\sqrt{2} \Rightarrow \sqrt{2} \le y \le 2\sqrt{2}$

$y - x < 0$ ✓ $\Rightarrow 2\sqrt{2} \le x - y + x + y \le 4\sqrt{2} \Rightarrow \sqrt{2} \le x \le 2\sqrt{2}$

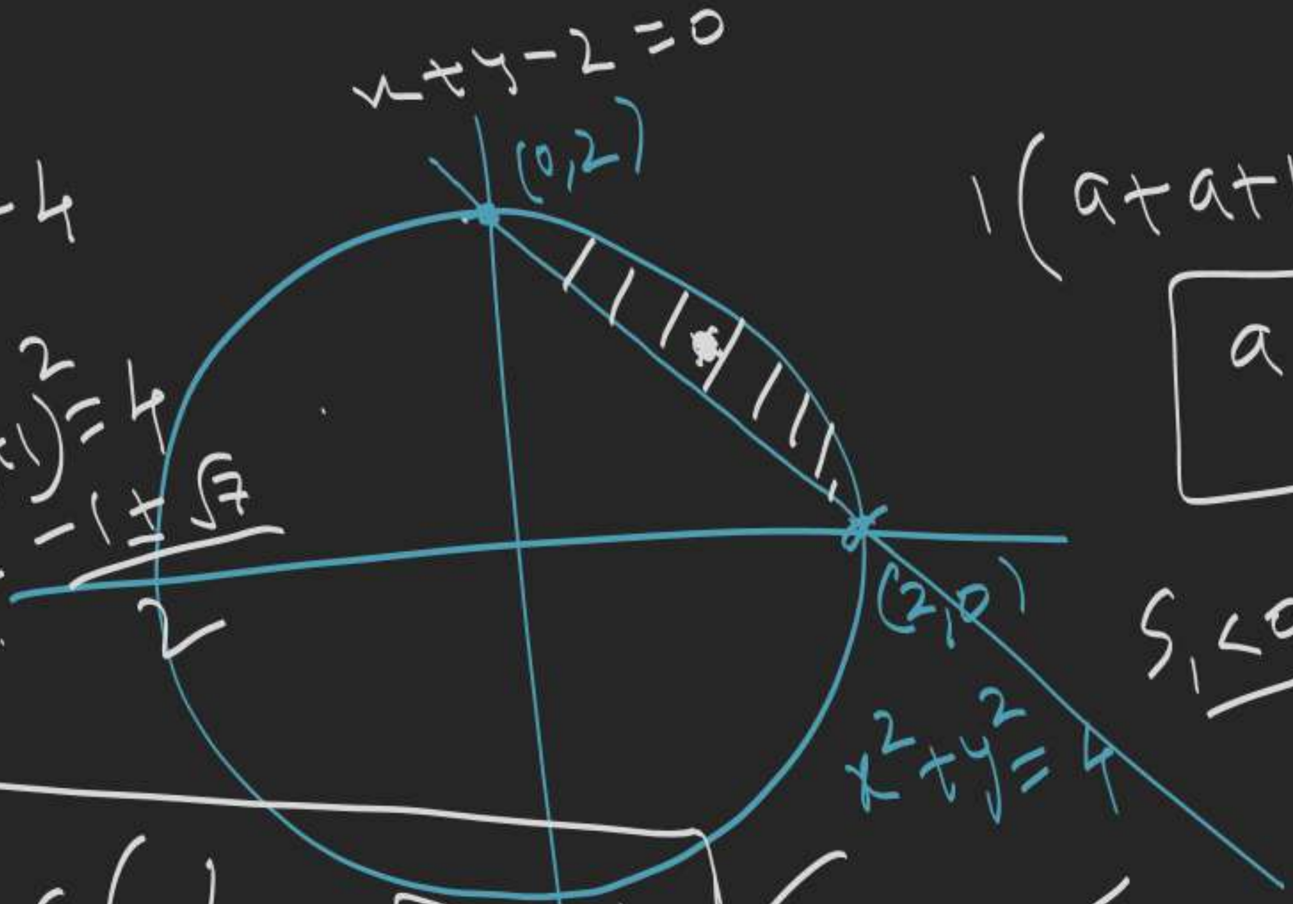
1. For what 'a' the point $\boxed{(a, a+1)}$ lies inside the region bounded by circle $\boxed{x^2+y^2=4}$ and the line $x+y=2$ in the first quadrant.



$S = x^2+y^2-4$

$x^2+(x+1)^2=4$

$x = \frac{-1\pm\sqrt{7}}{2}$



$1(a+a+1-2) > 0$

$\boxed{a > \frac{1}{2}}$ ✓

$S_1 < 0 \Rightarrow a^2+(a+1)^2-4<0$

$2a^2+2a-3<0$

✓ $a \in \left(\frac{-1-\sqrt{7}}{2}, \frac{-1+\sqrt{7}}{2}\right)$

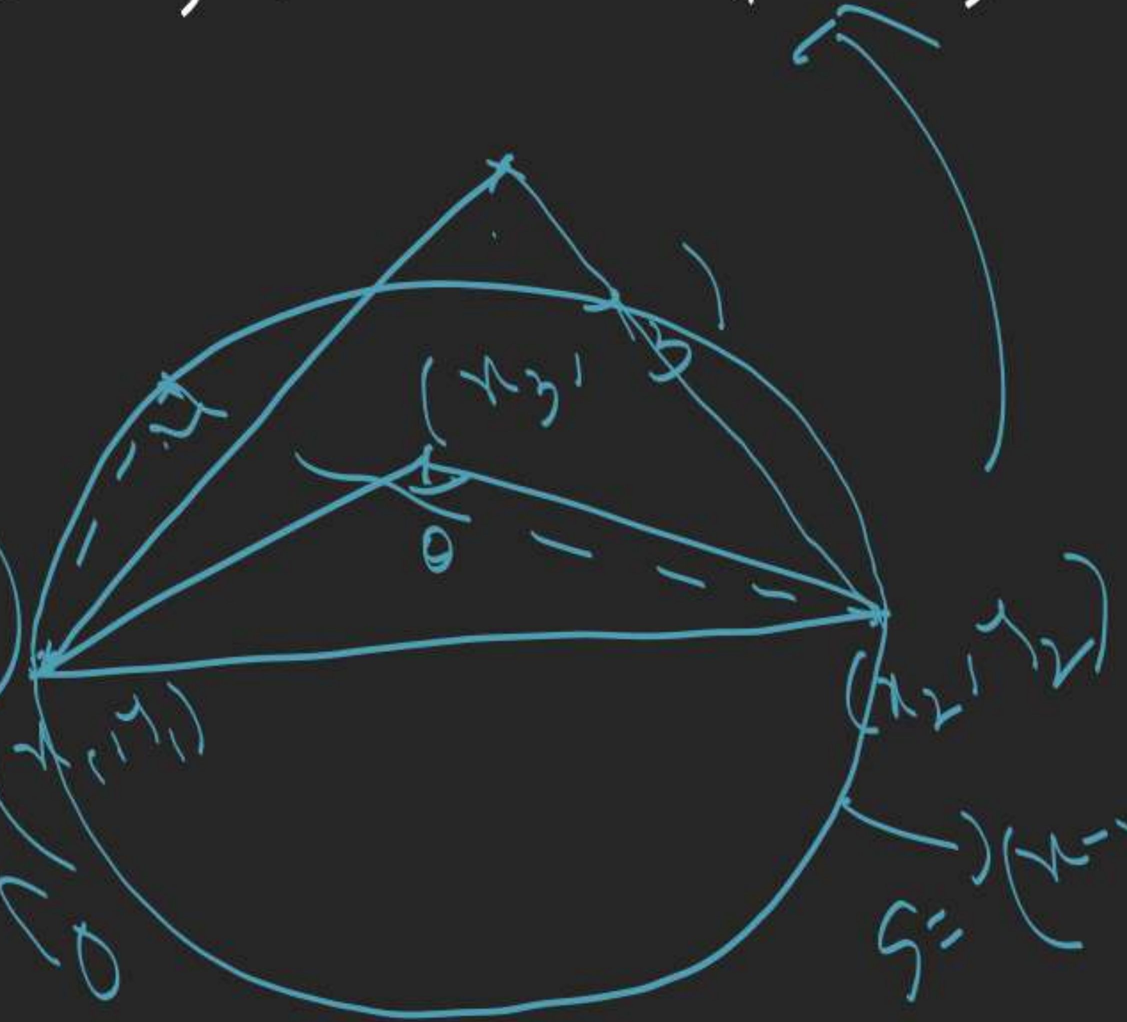
$\boxed{a \in \left(\frac{1}{2}, \frac{\sqrt{7}-1}{2}\right)}$ ✓

Q2. If the segment joining (x_1, y_1) & (x_2, y_2) make an obtuse angle at (x_3, y_3), then

P.T. $(x_3-x_2)(x_3-x_1)+(y_3-y_2)(y_3-y_1) < 0$.

$S_1 < 0$

$(x_3-x_1)(x_3-x_2)+(y_3-y_1)(y_3-y_2) < 0$



$S = (x-x_1)(x-x_2)+(y-y_1)(y-y_2)=0$

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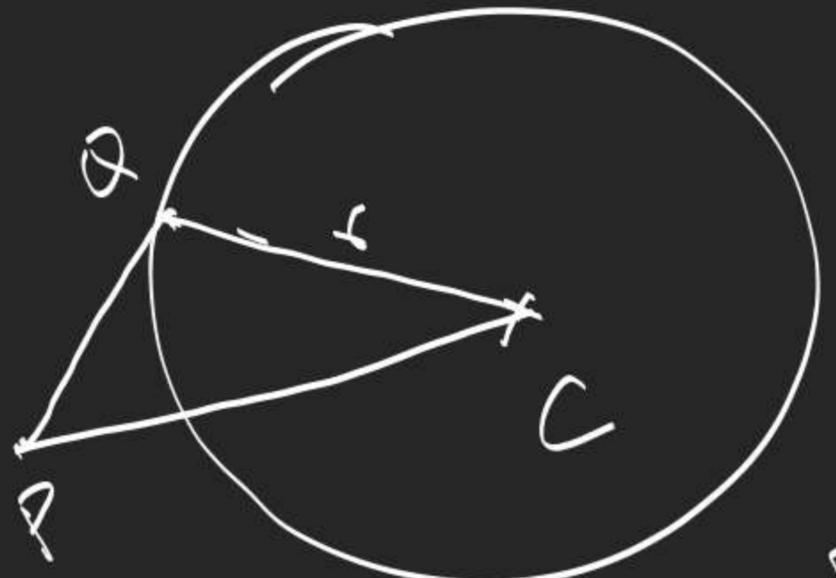
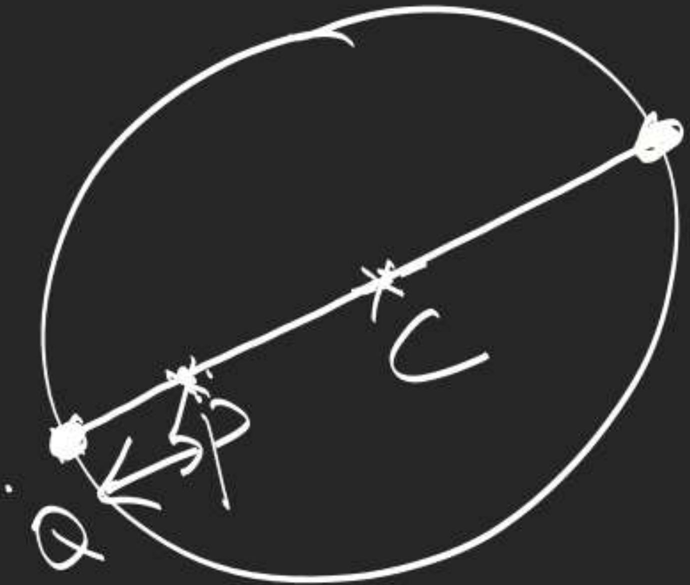
Minimum & Maximum Distance of a point from a Circle



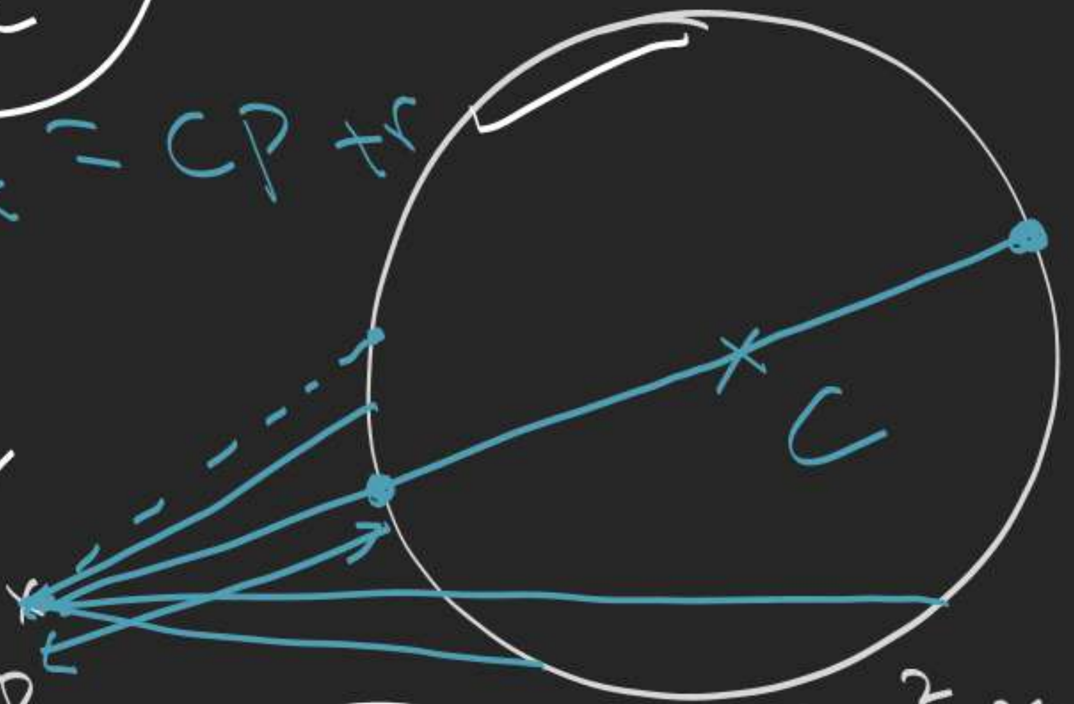
$d_{min} = |CP - r|$

$d_{max} = CP + r$



$CP - r \leq \boxed{PQ}$

$CP + r \geqslant PQ$



$(\alpha,\beta)P$

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