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3.(b)

$\boxed{(a+b)^2, -(a-b)^2}$

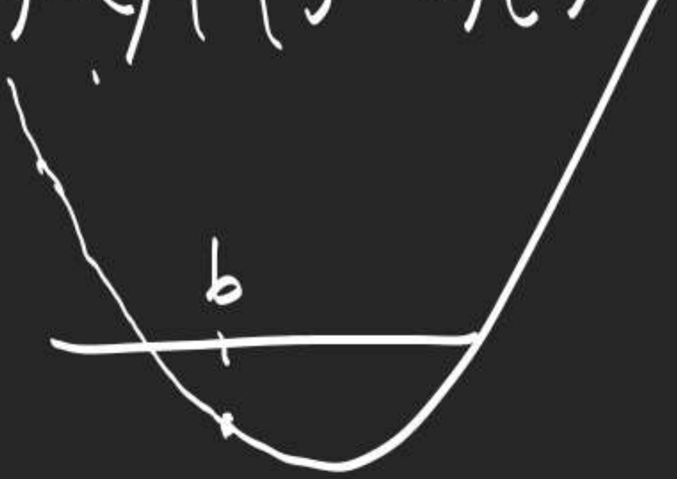
$a = b \neq c$

$(y-a)^2 + 2(y-a)(y-c) = 0$

$(\alpha+\beta)^2 - 4\alpha\beta$

$a < b < c$

$f(y) = (y-a)(y-b) + (y-b)(y-c) + (y-c)(y-a)$



$\left(-(a+b)\right)^2$

$f(a) = (a-b)(a-c) > 0$ ✓

$f(b) = (b-c)(b-a) < 0$ ✓

$f(c)$

$\underbrace{(a+b)^2 - 2(a^2+b^2)}$

$= -(a-b)^2$

$x^2 - 10x + 24 = (x-4)(x-6)$

$\boxed{x^2 - 11x + 24 = 0} \to 8, 3$

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$\alpha+\beta=p \qquad \alpha\beta=q$

$(\alpha-2)(\beta+2)=r=\underline{\alpha\beta}+2\underline{\underline{(\alpha-\beta)}}-4$

$\left(r-q+4\right)^2=4\left((\alpha+\beta)^2-4\alpha\beta\right)$

$=4\left(p^2-4q\right)$

$(x^2-3x)^2-3(x^2-3x)-28=0$

$3\times5<4\times6 \begin{cases} 3<4 \\ 5<6 \end{cases}$

$a_1a_2>0,\ D=b_1^2b_2^2-4a_1a_2c_1c_2 < 0$

$a_1>0$ & $b_1^2<a_1c_1$

$a_2>0$ & $b_2^2<a_2c_2 \Rightarrow b_1^2b_2^2<a_1a_2c_1c_2<4a_1a_2c_1c_2$

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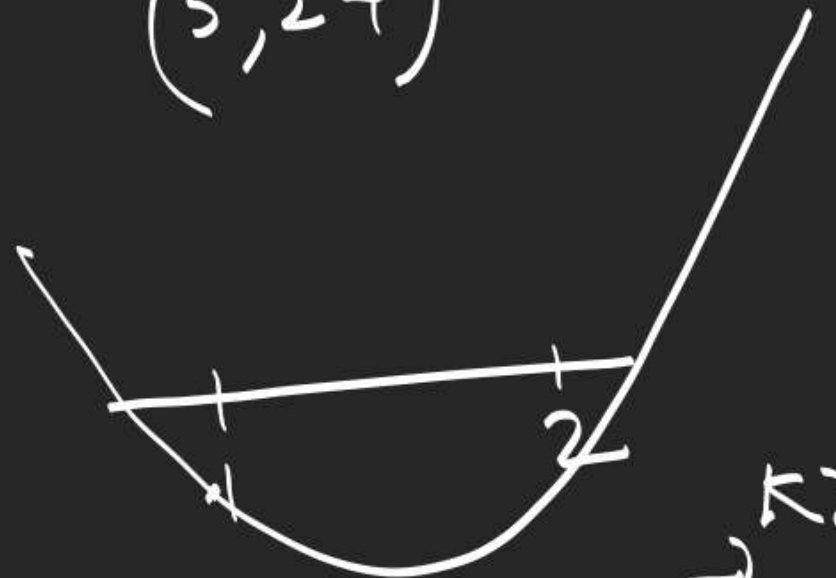
$\alpha \neq \beta \quad , \alpha, \beta \in (-6, 1) \qquad f(x) = x^2 + 2(k-3)x + 9 = 0$

$\left(6, \frac{27}{4}\right)$

$(5, 24)$



$D > 0$

$-6 < -(k-3) < 1$

$f(-6) > 0$

$f(1) > 0$

$k > 5$

$a f(1) < 0 \Rightarrow (k-5)(-9) < 0$

$a f(2) < 0 \Rightarrow (k-5)(k-24) < 0$

$k \in (5, 24)$

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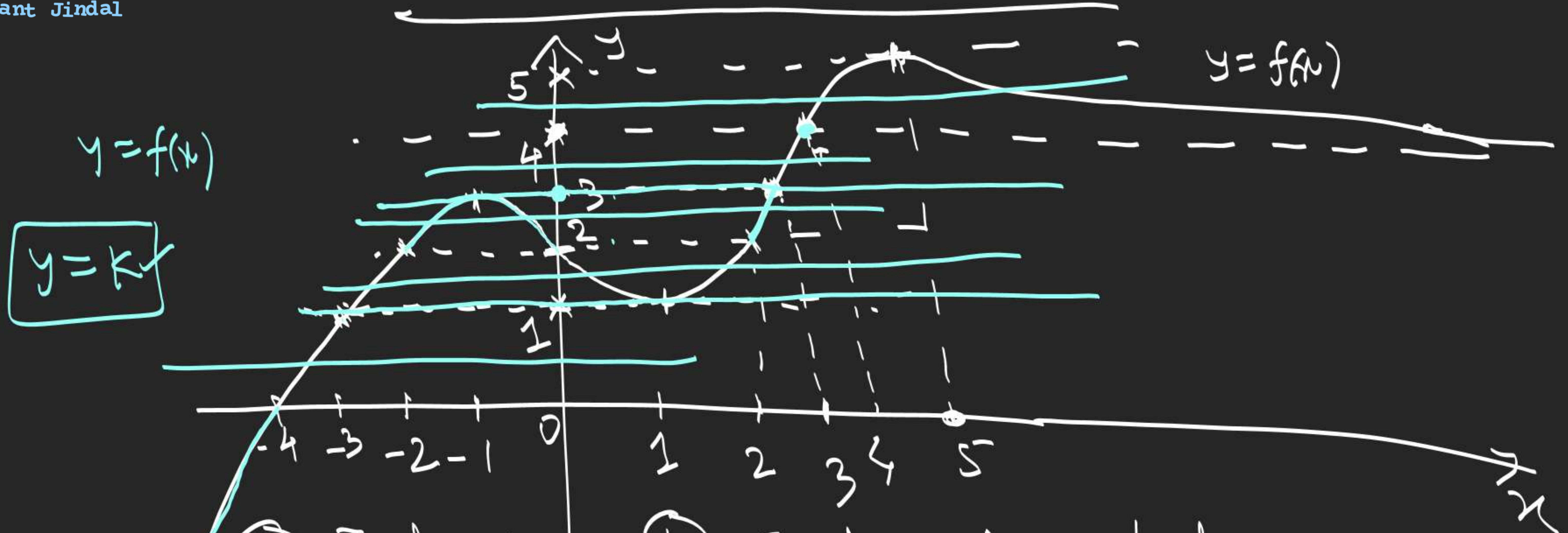

② Find k for which $f(x) = k$ has

① Find x for which

(i) 2 distinct real roots $\rightarrow \{1, 3\} \cup (4, 5)$

(ii) 3 — " — $\rightarrow (1, 3)$

(iii) 4 — " — $\rightarrow \phi$

(iv) no solutions $(5, \infty)$

(v) 1 distinct solutions $(-\infty, 1) \cup [3, 4] \cup \{5\}$

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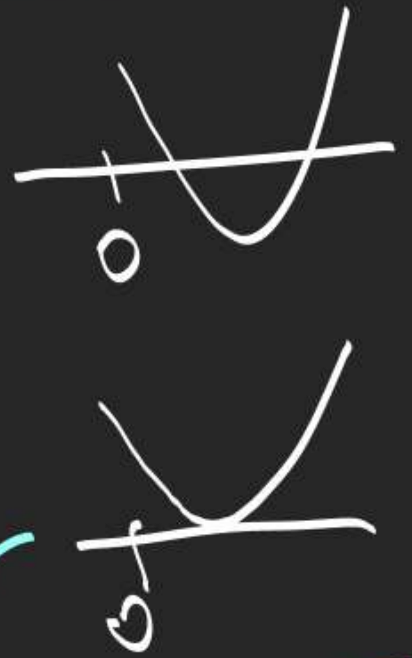
1: Find 'a' for which the equation

$f(x) = x^2 + 2(a-1)x + a + 5 = 0$ has atleast one positive root.

$\boxed{a \in (-\infty, -1]}$

both roots > 0

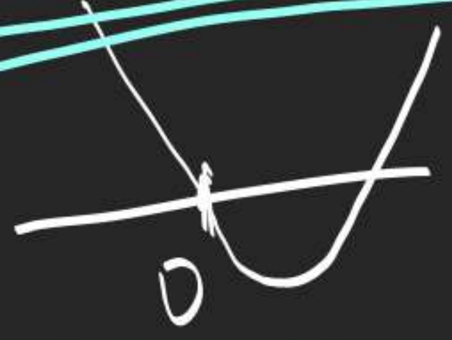


exactly $1 > 0$

$f(0) < 0 \rightarrow a + 5 < 0$

$\boxed{a < -5}$

$\boxed{a \in (-\infty, -5)}$ ✓



$a \in [-5, -1] \Leftarrow \boxed{D \geq 0, \quad -\frac{b}{2a} > 0, \quad f(0) \geq 0}$

$(a-1)^2 - (a+5) \geq 0$

$a^2 - 3a - 4 \geq 0$

$a \in \boxed{(-\infty, -1] \cup [4, \infty)}$

$-(a-1) > 0 \Rightarrow \boxed{a < 1}$

$a + 5 \geq 0$

$\boxed{a \geq -5}$

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$x^2+2(a-1)x+a+5=0$ atleast one +ive root.

$x^2-2x+5+a(2x+1)=0$

$\Rightarrow -a = \dfrac{x^2-2x+5}{2x+1} = f(x) =$

$f(2)=1$

$f'(x)=\dfrac{(2x+1)(2x-2)-2(x^2-2x+5)}{(2x+1)^2} = \dfrac{2(x^2+x-6)}{(2x+1)^2} = \dfrac{2(x+3)(x-2)}{(2x+1)^2}$

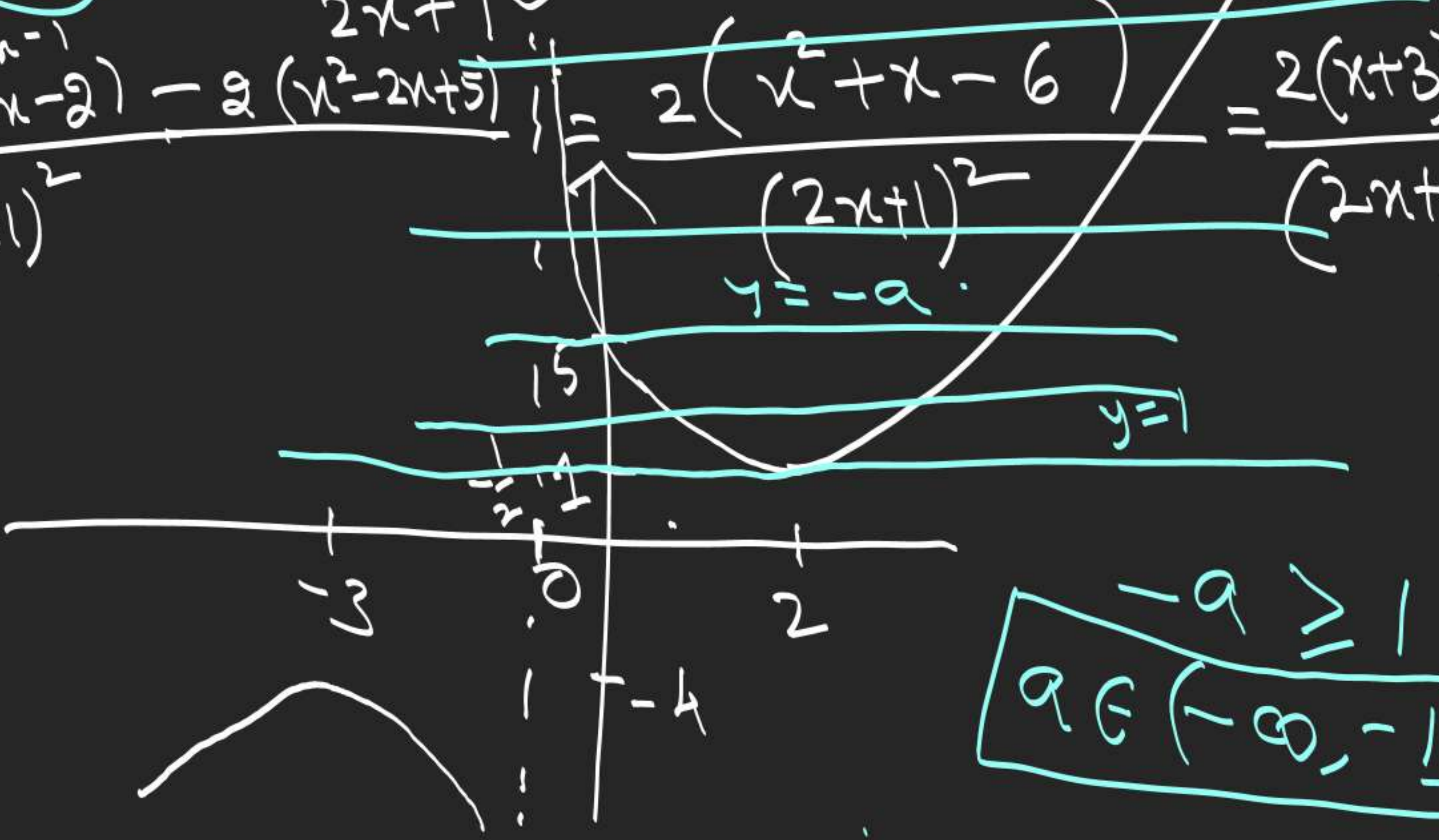
$f(-3)=-4$

$f(2)$ $f(x)=\dfrac{x\left(1-\frac{2}{x}+\frac{5}{x^2}\right)}{\left(2+\frac{1}{x}\right)}$

$x\to-\infty,\ f(x)\to-\infty$

$x\to\infty,\ f(x)\to\infty$

$(-3,2)$



$-a \geq 1$

$\boxed{a \in (-\infty,-1]}$

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1: Let $a, b, c \in R$, $a \neq 0$. If α, β be roots of equation $ax^2+bx+c=0$, where $\alpha < -n$, and $\beta > n$. Then P.T. $1+\frac{c}{an^2}+\frac{1}{n}\left|\frac{b}{a}\right|<0$, $n \in N$.

2: Find set of real values of p for which inequality $x^2-2px+3p+4<0$ is satisfied for atleast one real x.

$\boxed{\text{PT-3 \& PT-4}}$