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13. $\boxed{b^2-ac>0}$ $\quad \left(a(a+c)+2(b^2-ac)\right)x^2+2b(a+c)x+\left(c(a+c)+2(b^2-ac)\right)$

$$D = 4\left[b^2(a+c)^2-ac(a+c)^2-2(b^2-ac)(a+c)^2-4(b^2-ac)^2\right] = 0$$

$$= 4\left[-b^2(a+c)^2+ac(a+c)^2-4(b^2-ac)^2\right]$$

$$= 4\left[\underbrace{-(b^2-ac)(a+c)^2}\underbrace{-4(b^2-ac)^2}\right] < 0$$

Nishant Jindal

$$y\left(bcx^2-(ac+bd)x+ad\right) = adx^2-(ac+bd)x+bc.$$

$$(ybc-ad)x^2-(ac+bd)(y-1)x+(ady-bc)=0.$$

$$(ac+bd)^2(y^2-2y+1)-4\left(abcd\,y^2-y(b^2c^2+a^2d^2)+abcd\right)\geq 0$$

$$(ac-bd)^2y^2+\left(2(b^2c^2+a^2d^2)-(ac+bd)^2\right)2y+(ac-bd)^2\geq 0 \quad \forall y\in\mathbb{R}.$$

$$D\leq 0 \Rightarrow \left(2(b^2c^2+a^2d^2)-(ac+bd)^2-(ac-bd)^2\right)\left(2(b^2c^2+a^2d^2)-(ac+bd)^2+(ac-bd)^2\right)\leq 0$$

$$\Rightarrow \cancel{4}\left((b^2c^2+a^2d^2)-(a^2c^2+b^2d^2)\right)\left(b^2c^2+a^2d^2-2abcd\right)\leq 0$$

$$(b^2-a^2)(c^2-d^2)(bc-ad)^2\leq 0$$

Nishant Jindal

$lx^2 + mxy + ny^2 = 0 \Rightarrow nt^2 + mt + l = 0$

$\frac{y}{x} = t = \text{const} = \alpha, \beta$

$\boxed{y = \alpha x}$ $y = \beta x$

$\frac{y}{x} = t$

$l'x^2 + m'xy + n'y^2 = 0 \Rightarrow n't^2 + m't + l' = 0$

$\frac{x^2 - 2x + 6}{1} = f(x)$

$\frac{t^2}{} = \frac{t}{} = \frac{1}{}$

rational

$f(x) = \frac{x^3 - x^2 + 2x - 1}{x^2 - 3x + 7}$

Rational function

$$\boxed{f(x) = \frac{\text{Polynomial function}}{\text{Polynomial function}}}$$

Nishant Jindal

1. Show that in equation $x^2-3xy+2y^2-2x-3y-35=0$, for every real value of x there is a real value of y, and for every real value of y there is a real x.

$$y = \frac{3(x+1) \pm (x+17)}{4} = x+5,\ \frac{x-7}{2}$$

for what $x=$? there is a real y

$x=1$

$$\underset{=0}{2y-x+7},\quad \underset{=0}{y-x-5}$$

$$2y^2-(3x+3)y+x^2-2x-35=0$$

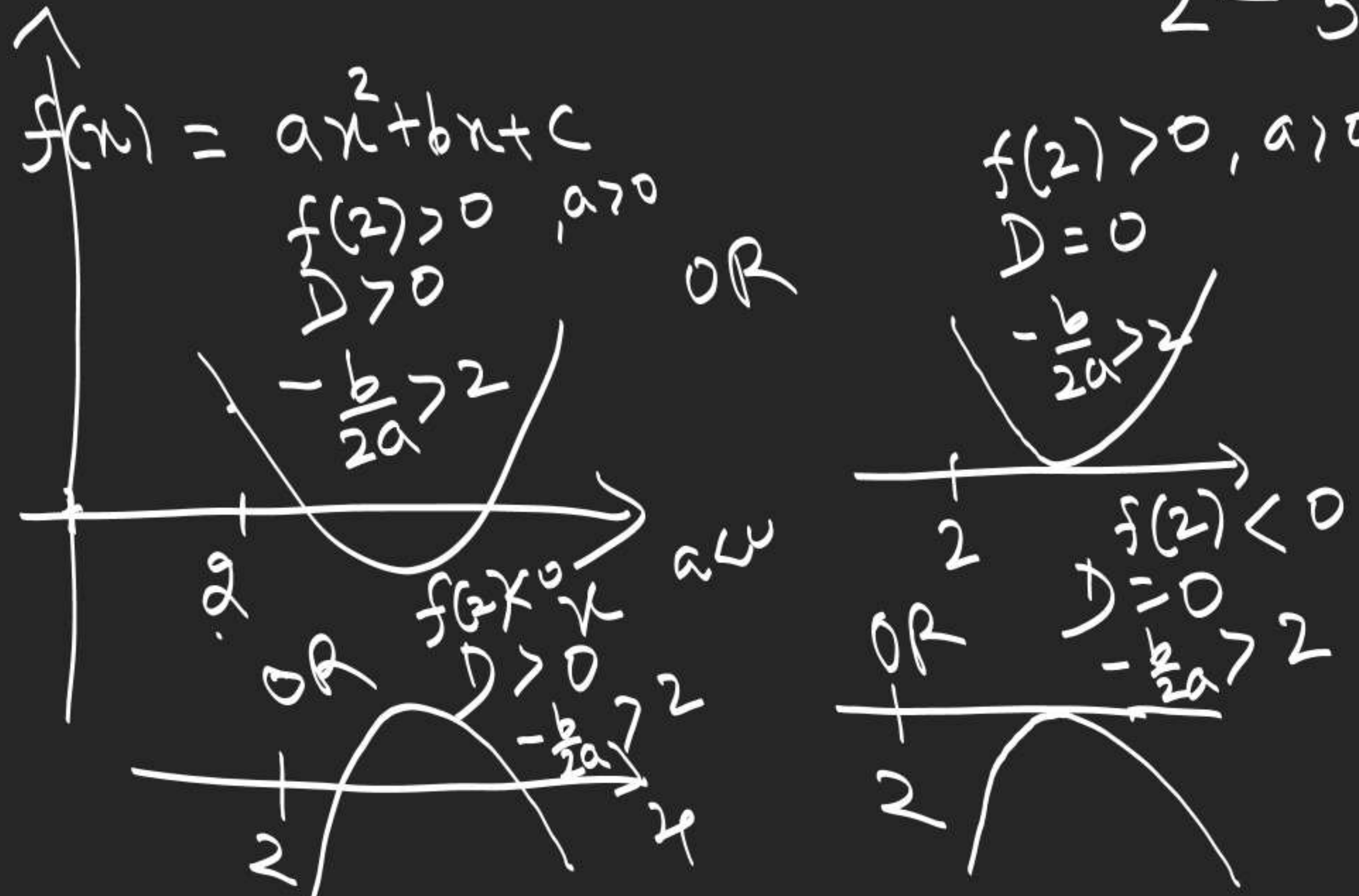
$$D \geq 0 \Rightarrow 9(x+1)^2-8(x^2-2x-35) \geq 0$$

$$x^2+34x+289 \geq 0$$

$$(x+17)^2 \geq 0 \Rightarrow \boxed{x \in \mathbb{R}}$$

Nishant Jindal

Condition for both roots of quadratic eqn. $ax^2+bx+c=0$, $a, b, c \in R$, $a \neq 0$ to be more than 2



$2-3i \not> 2$

$af(2)>0$

$D \geq 0$

$-\frac{b}{2a}>2$

Condition for $ax^2+bx+c=0$, $a, b, c \in R$, $a \neq 0$ to have both roots $\leq K$

$2 \leq 3$ T

$D \geq 0$

$-\frac{b}{2a} \leq K$

$af(K) \geq 0$

Nishant Jindal

* Condition for $ax^2+bx+c=0$, $a, b, c \in \mathbb{R}$, $a \neq 0$ to have both roots in interval $[k_1, k_2]$

* ———— " ————

one root $< k_1$ & other root $> k_2$, $k_1 < k_2$

$\boxed{\text{Ex-9(c)} \quad 7, 8, 9, 10.}$

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