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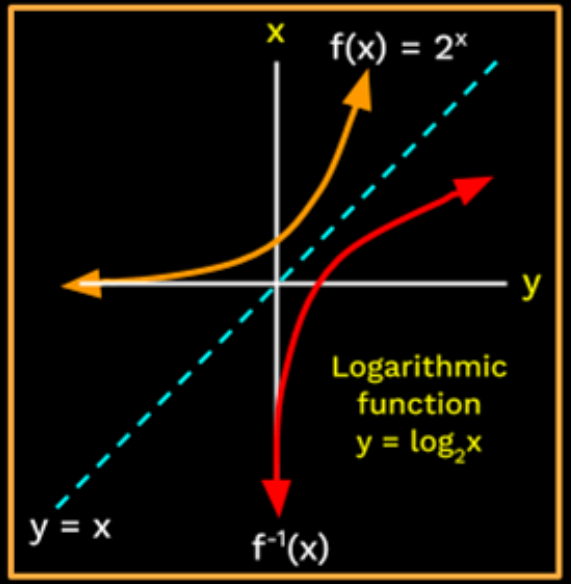

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Sameer Chincholikar

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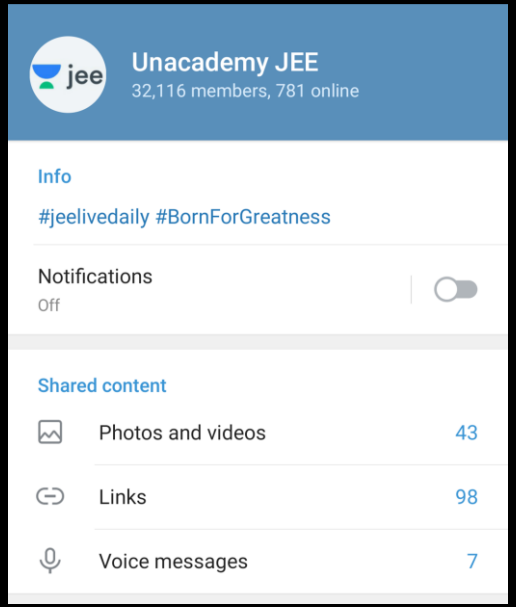

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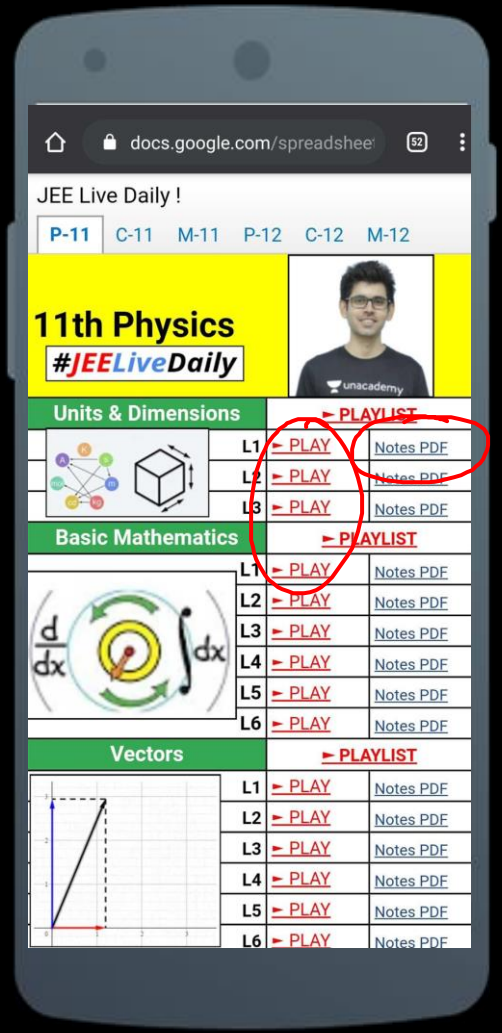

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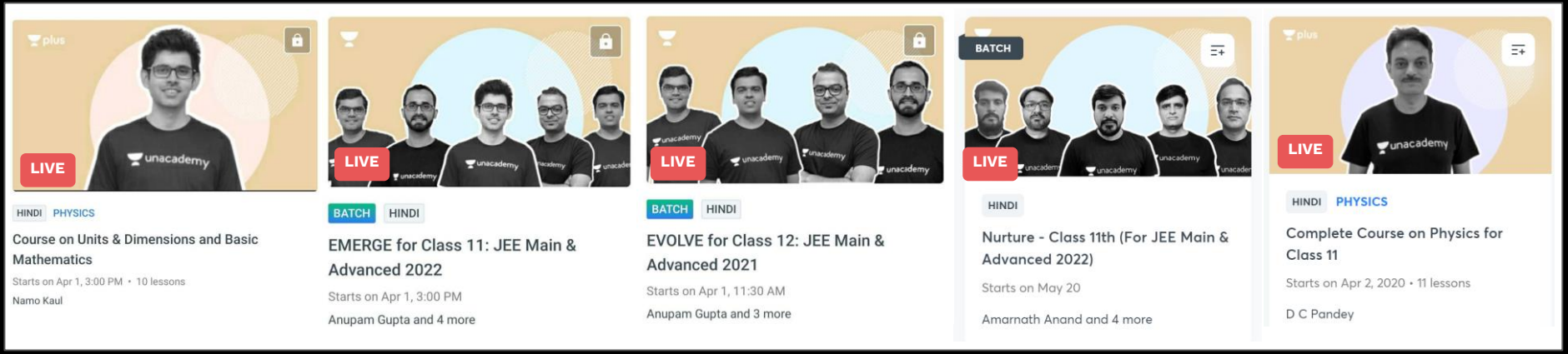

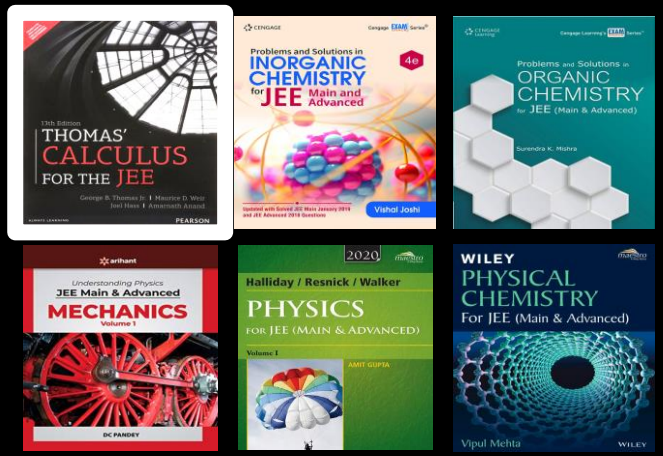

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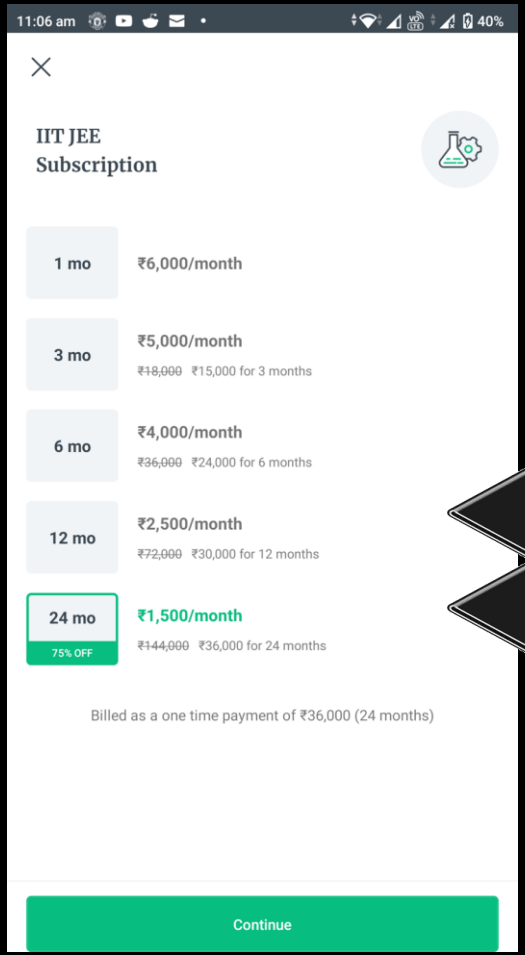

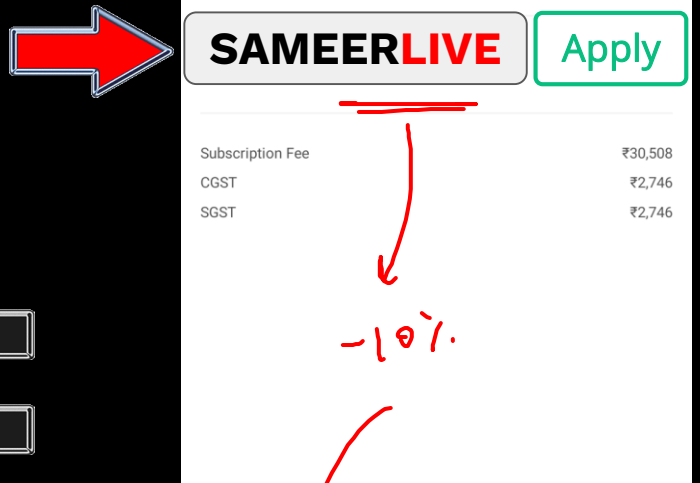

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Solve for x: $\left(\frac{1}{5}\right)^{\frac{|x+2|}{2-|x|}} > 25$

$\Rightarrow (5)^{\frac{|x+2|}{|x|-2}} > (5^{-2})$

A. (2, 6)

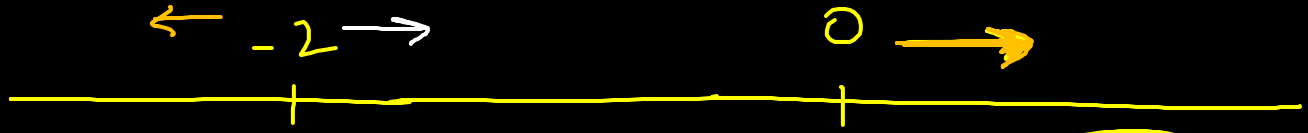
B. (2, ∞)

C. (-6, -2) ∪ (2, 6)

D. (-6, -2)

$\frac{|x+2|}{|x|-2} > 2$ $\Rightarrow$ $\frac{|x+2| - 2|x| + 4}{|x|-2} > 0$

$\frac{|(x+2)|}{|x|-2} - 2 > 0$ $\Rightarrow$



$$\frac{-(x+2)+2x+4}{-x-2} > 0$$

$$\frac{(x+2)}{-(x+2)} > 0$$

$$-1 > 0$$

×

$$\frac{(x+2)+2x+4}{-x-2} > 0$$

$$\frac{3x+6}{-(x+2)} > 0$$

$$\frac{3(x+2)}{-(x+2)} > 0$$

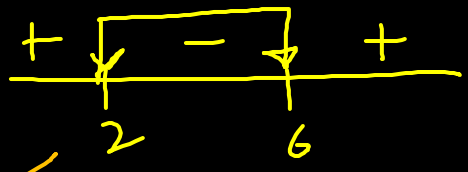
$$-3 > 0$$

×

$$\frac{(x+2)-2(x)+4}{x-2} > 0$$

$$\frac{-x+6}{x-2} > 0$$

$$\frac{x-6}{x-2} < 0$$



$$x \in (2,6)$$

Solve of $2^x + 2^{|x|} \geq 2\sqrt{2}$

A. $\left(-\infty, \log_2(\sqrt{2}+1)\right)$

B. $(0, \infty)$ ✗

5

C. $\left(\frac{1}{2}, \log_2(\sqrt{2}-1)\right)$ ✗ ✗

D. $\left(-\infty, \log_2(\sqrt{2}-1)\right] \cup \left[\frac{1}{2}, \infty\right)$

Case-1 : $x \geq 0$

$2^x + 2^x \geq 2\sqrt{2}$

$2 \cdot (2^x) \geq 2\sqrt{2}$

$\log_2(2^x) \geq \log_2(\sqrt{2})$

$x \geq \frac{1}{2}$

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*Case-2: $x < 0$

$$2^x + 2^{-x} \geq 2\sqrt{2}$$

$$2^x + \frac{1}{2^x} \geq 2\sqrt{2}$$

Let: $2^x = t > 0$

$$t + \frac{1}{t} \geq 2\sqrt{2}$$

$$t^2 + 1 \geq 2\sqrt{2}\,t$$

$$t^2 - 2\sqrt{2}\,t + 1 \geq 0 \quad \text{— (1)}$$

Roots of $t^2 - 2\sqrt{2}\,t + 1 = 0$

$$t = \frac{2\sqrt{2} \pm \sqrt{8-4}}{2}$$

$$t = \frac{2\sqrt{2} \pm 2}{2}$$

$$t = \sqrt{2} \pm 1$$

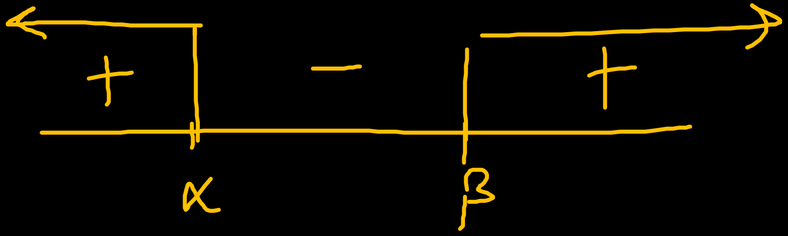
$\alpha = (\sqrt{2}-1)$

$\beta = (\sqrt{2}+1)$

Eg: $x^2 - 5x + 6 = (x-2)(x-3)$ → α, β

______ × ______ × ______ × ______

$(t-\alpha)(t-\beta) \geq 0$



$t \in (-\infty, \sqrt{2}-1] \cup [\sqrt{2}+1, \infty)$

C-1: $2^x \leq (\sqrt{2}-1)$

$x \leq \log_2(\sqrt{2}-1)$ → (−)

C-2: $2^x \geq (\sqrt{2}+1)$

$x \geq \log_2(\sqrt{2}+1)$ → (+)

If $\sqrt{2^{2x}-7} < 2^x - 1$, then complete set of values of x is

A. $(3, \log_2 7]$

B. $[\log_4 7, \log_2 7]$

C. $[\log_4 7, 2)$

D. None of these

5

Domain:

$2^{2x} - 7 \geq 0$

$4^x \geq 7$

$x \geq \log_4 7$

Case: $2^x - 1 \geq 0 \Rightarrow 2^x \geq 1 \Rightarrow x \geq 0$

On squaring:

$2^{2x} - 7 < (2^x - 1)^2$

$2^{2x} - 7 < 2^{2x} - 2 \cdot 2^x + 1$

$$2 \cdot 2^{x} < 8$$

$$2^{x} < 4$$

$$x < 2$$ ✓

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The domain of the function $f(x) = \log_{\left[x+\frac{1}{2}\right]} \left| x^2 - 5x + 6 \right|$

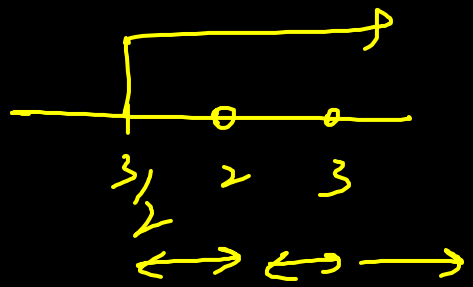
A. $\left[\frac{3}{2}, 2\right) \cup (2, 3) \cup (3, \infty)$

B. $\left[\frac{3}{2}, \infty\right)$ ×

C. $\left[\frac{1}{2}, \infty\right)$ ×

D. None of these

$[\cdot] \equiv$ G.I.F.



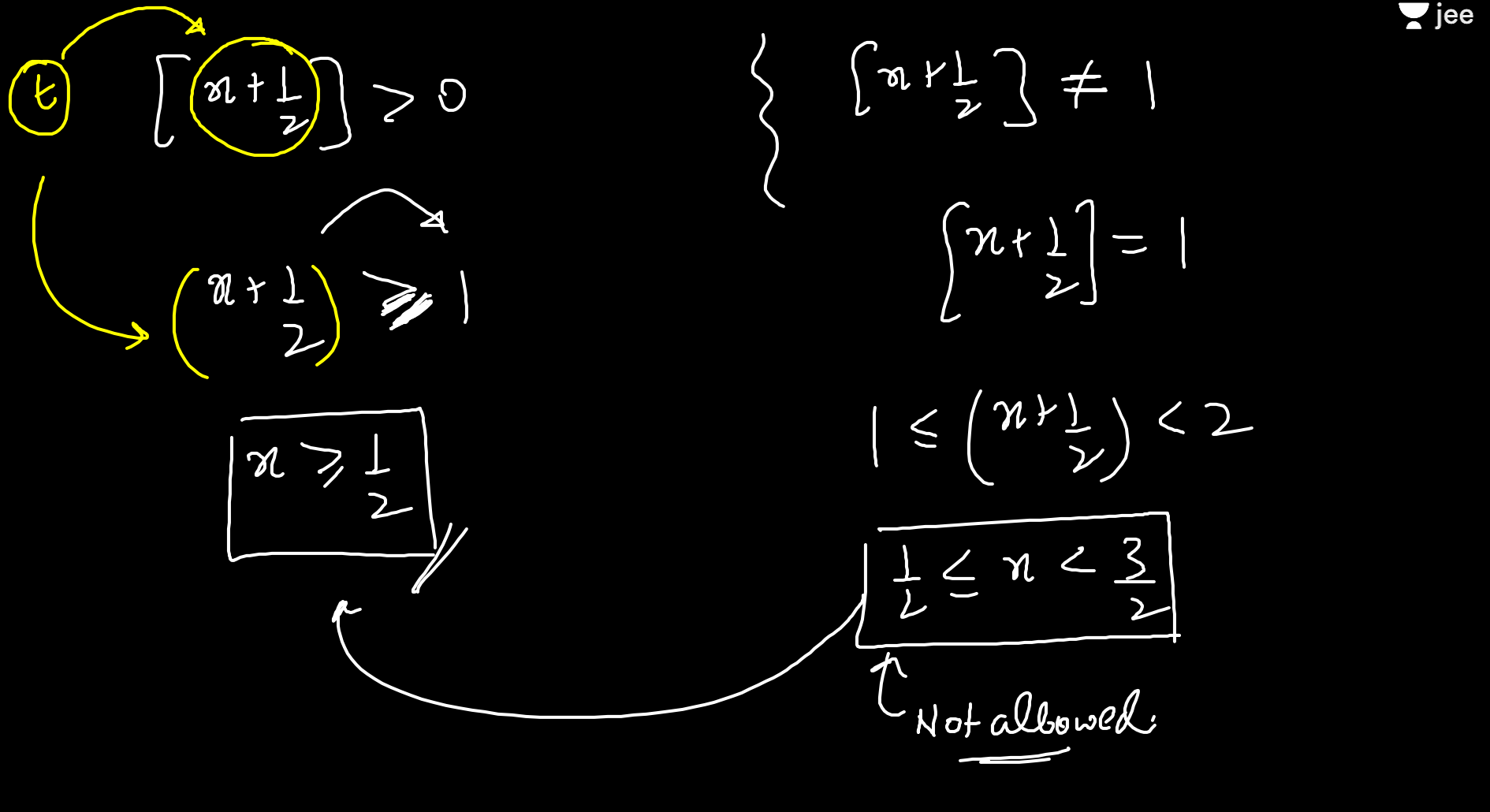
$\log_a N$ → $N > 0$

$a > 0 \; ; \; a \neq 1$

$|x^2 - 5x + 6| > 0$

$x^2 - 5x + 6 \neq 0$

$x \neq 2, 3$ ✓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[x + 1/2] ≥ 0
x + 1/2 ≥ 1
x ≥ 1/2
[x + 1/2] ≠ 1
[x + 1/2] = 1
1 ≤ (x + 1/2) < 2
1/2 ≤ x < 3/2
Not allowed.

If the domain of the given function is (a,b) then find a+b.

$$f(x) = \log_3 [-(\log_3 x)^2 + 5 \log_3 x - 6]$$

5

A. 9 **B.** 18 **C.** 27 **D.** 36

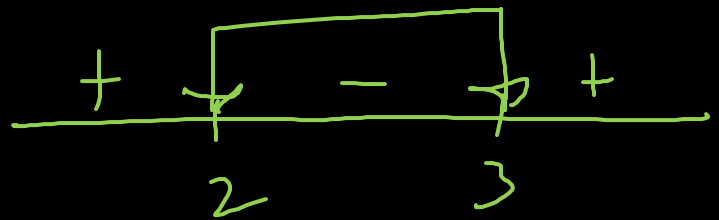
$$-(\log_3 x)^2 + 5(\log_3 x) - 6 > 0$$

Let: $\log_3 x = t$

$$-t^2 + 5t - 6 > 0$$

$t^2 - 5t + 6 < 0$

$(t-2)(t-3) < 0$



$\boxed{2 < t < 3}$

$2 < \log_3 x < 3$

$\boxed{9 < x < 27}$

Domain : $(9, 27)$

Range of $f(x) = \ell n (3x^2 - 4x + 5)$ is

input

A. $\left[\ell n \frac{11}{3}, \infty\right)$ B. $[\ell n\, 10, \infty)$ C. $\left[\ell n \frac{11}{6}, \infty\right)$ D. $\left[\ell n \frac{11}{12}, \infty\right)$

$\log_e$

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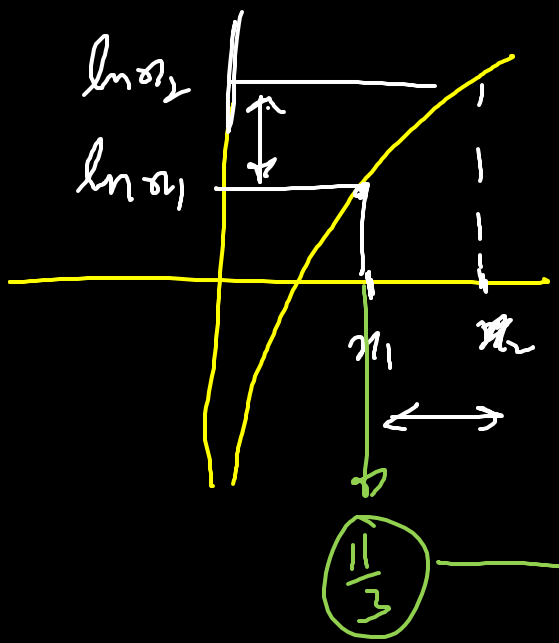


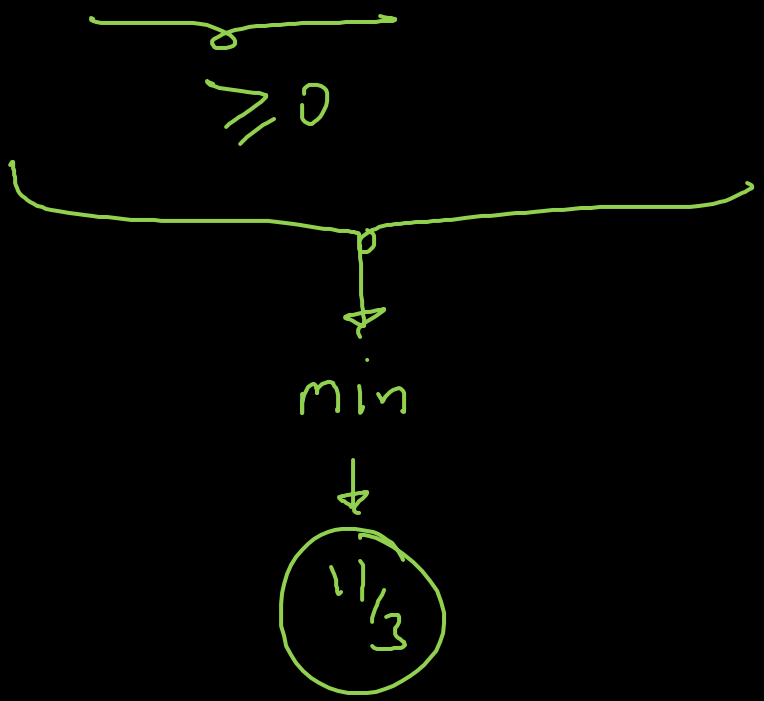
$3x^2 - 4x + 5$

$3\left(x^2 - \frac{4}{3}x\right) + 5$

$3\left[\left(x - \frac{2}{3}\right)^2 - \frac{4}{9}\right] + 5$

$3\left(x - \frac{2}{3}\right)^2 - \frac{4}{3} + 5$

$3\left(x-\frac{2}{3}\right)^2+\left(\frac{11}{3}\right)$ $\Big\}$ $\rightarrow \left[-\frac{D}{4a}, \infty\right)$



Domain of $f(x)=\sqrt{2\{x\}^2-3\{x\}+1}$ where $\{.\}$ denotes the fractional part, in $[-1,1]$ is

5

A. $[-1,1]\sim\left(\frac{1}{2},1\right)$

B. $\left[-1,-\frac{1}{2}\right]\cup\left[0,\frac{1}{2}\right]\cup\{1\}$

C. $\left[-1,\frac{1}{2}\right]$

D. $\left[-\frac{1}{2},1\right]$

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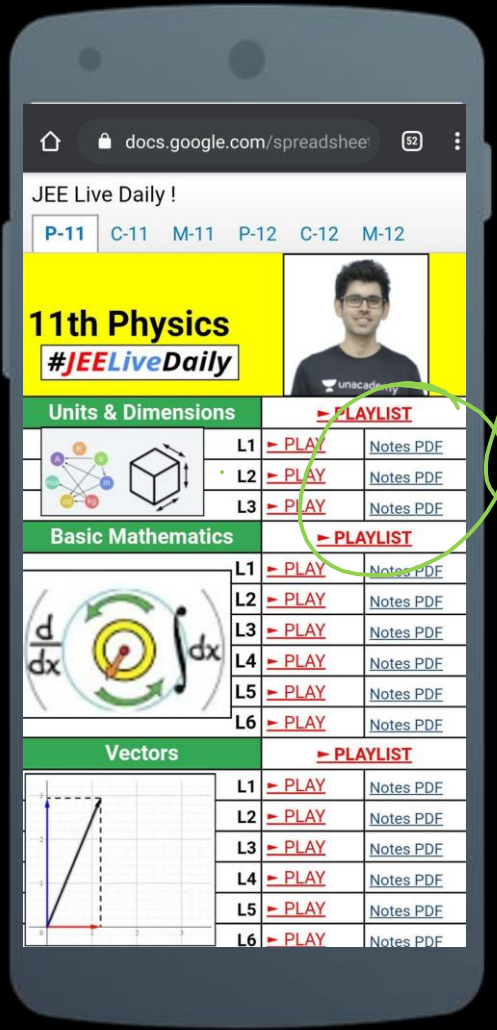

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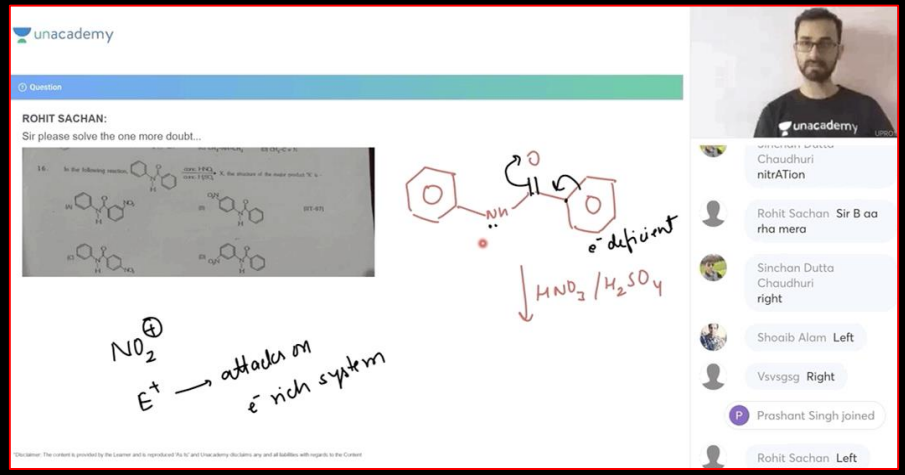

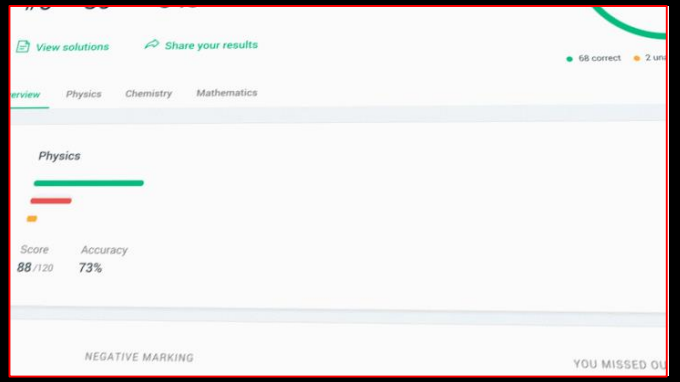

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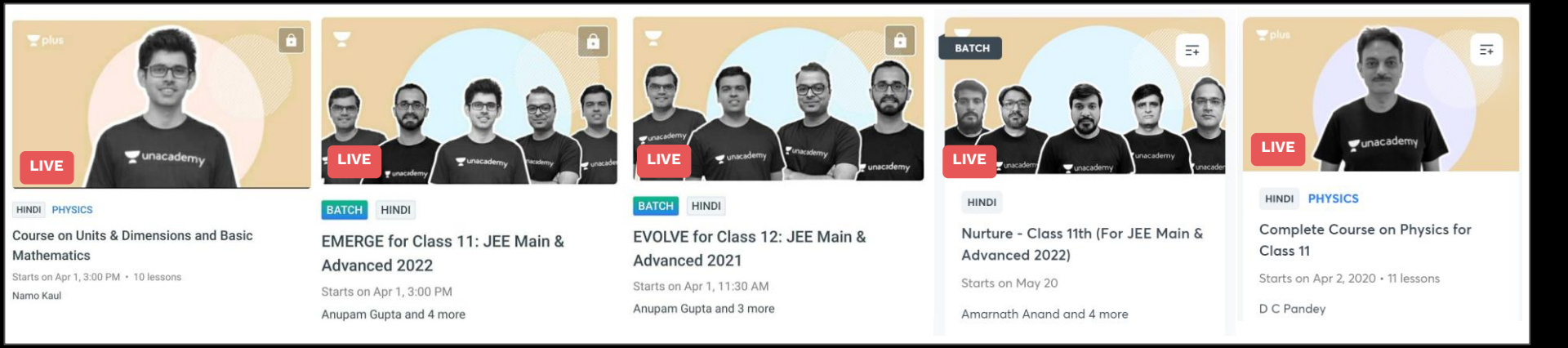

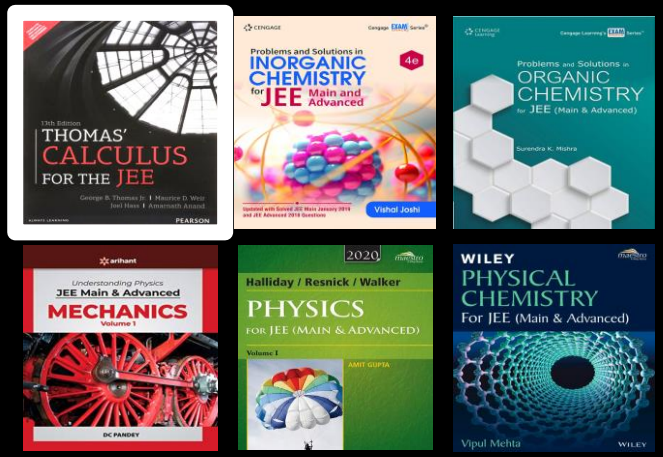

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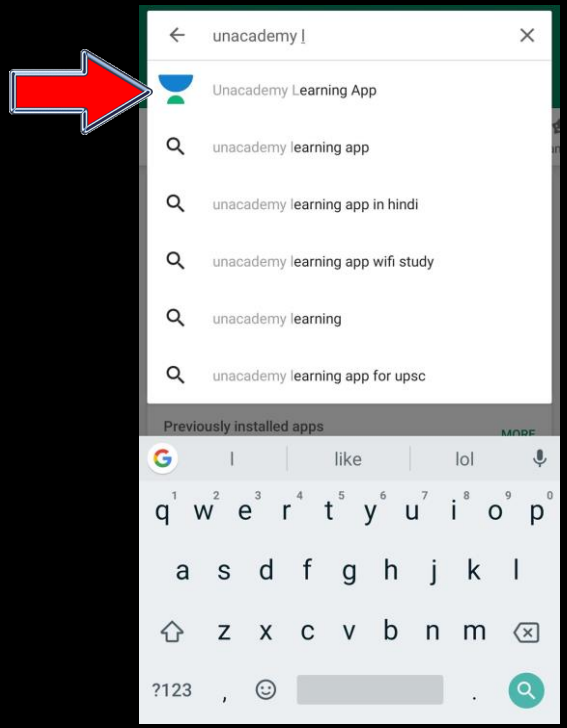
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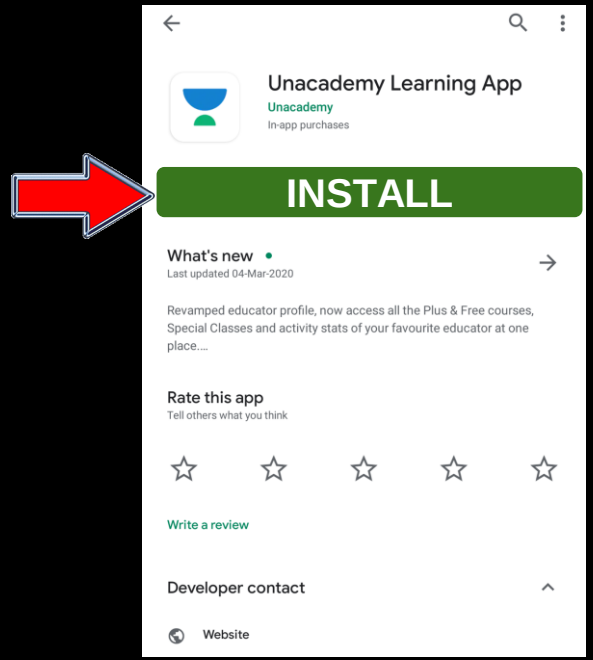
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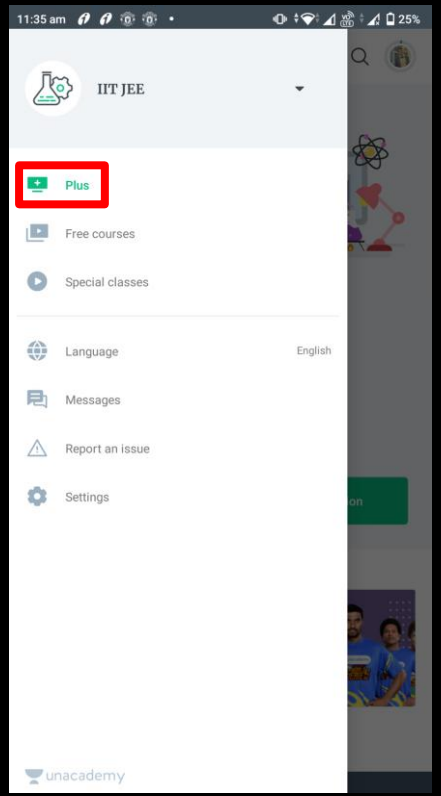

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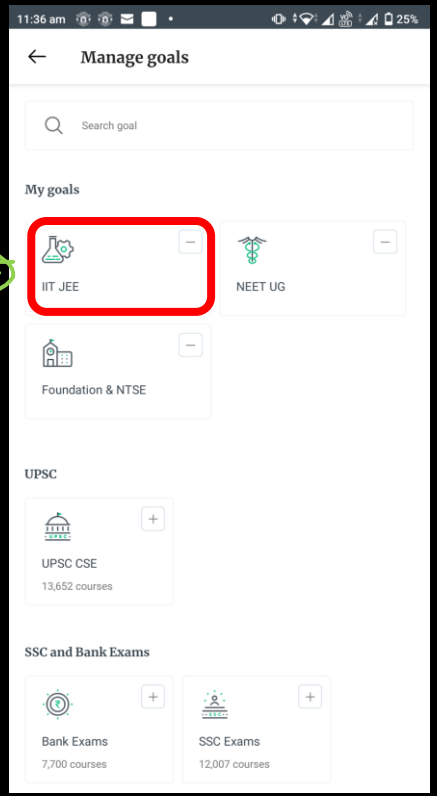

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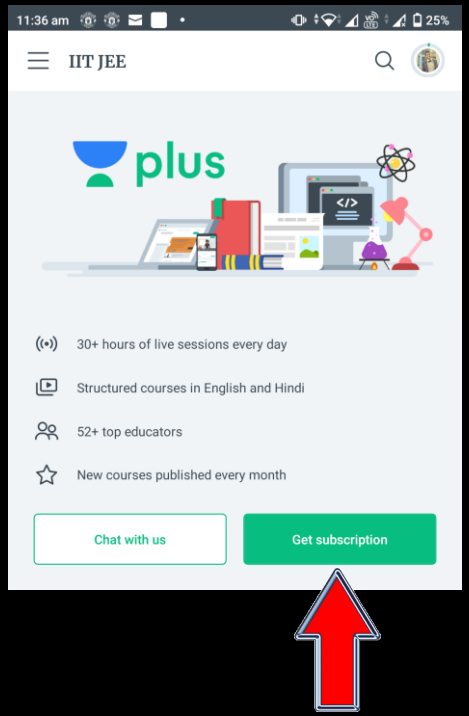

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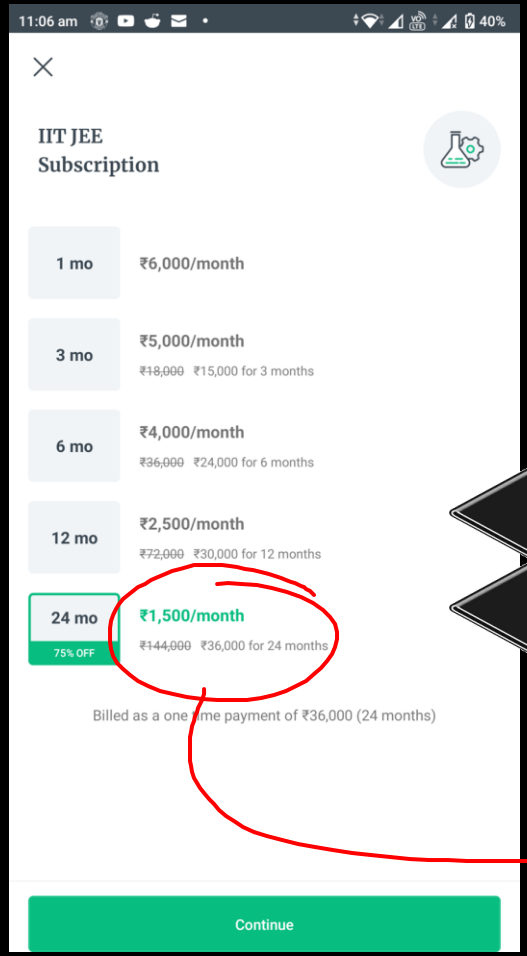
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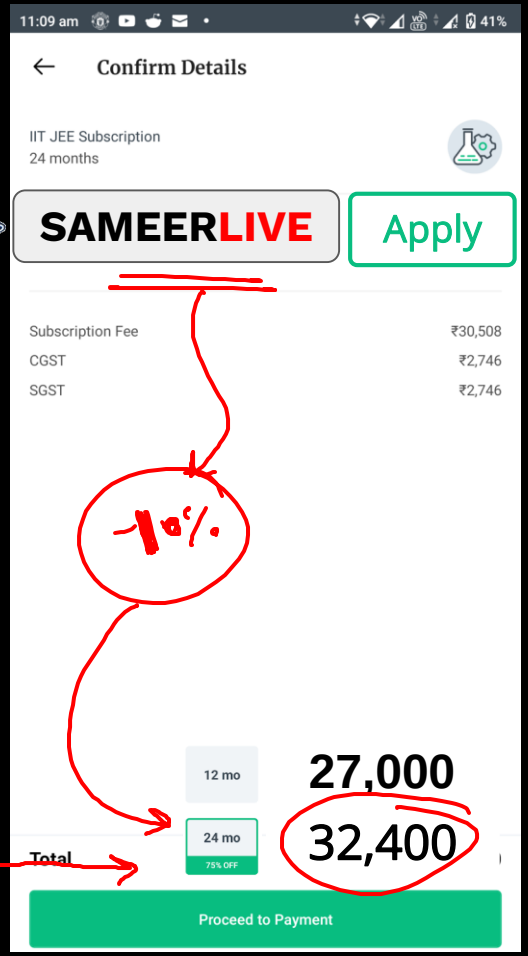
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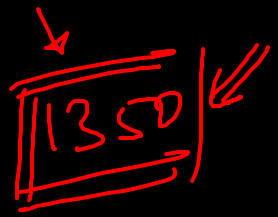
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