jee LIVE daily 3.0

Location of Roots -1

Quadratic Equations

7

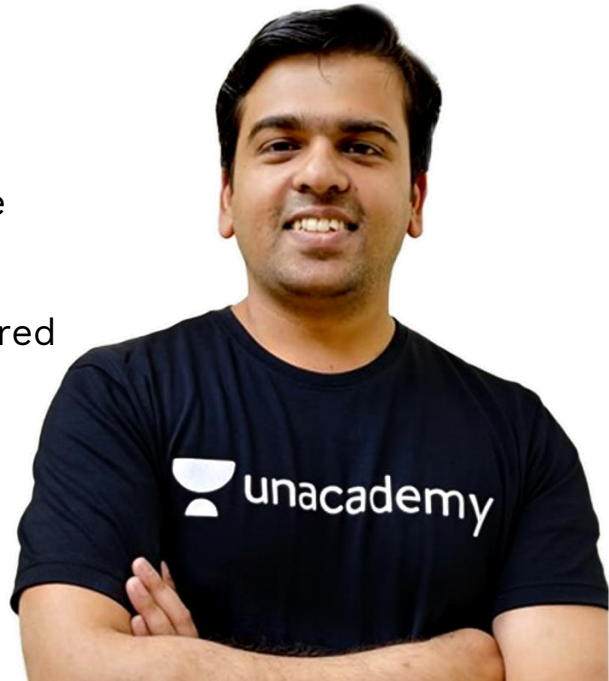
- $\alpha + \beta = \frac{-b}{a}$
- $\alpha\beta = \frac{c}{a}$
- $|\alpha - \beta| = \frac{\sqrt{D}}{|a|}$

jee LIVE daily 3.0

Sameer Chincholikar

B.Tech, M.Tech - IIT-Roorkee

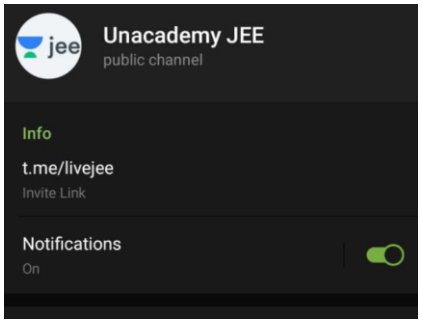
- **10+** years Teaching experience
- Taught **1 Million+** Students
- **100+** Aspiring Teachers Mentored



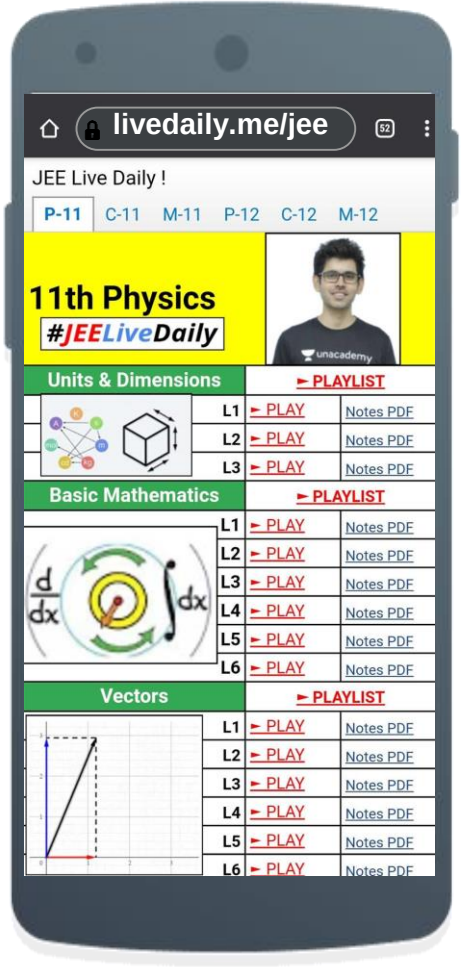
sameer_iitr

#JEE Live Daily

Telegram Channel

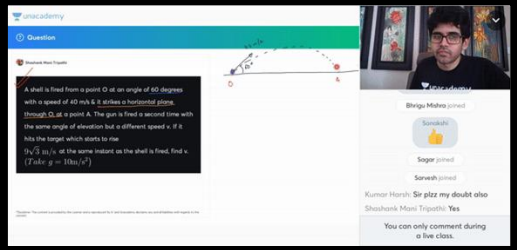


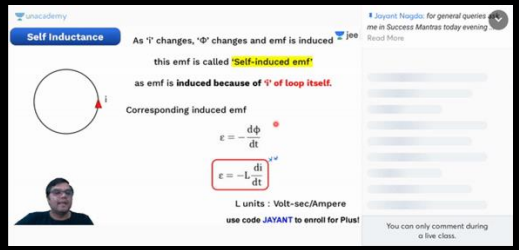
livedaily.me/jee

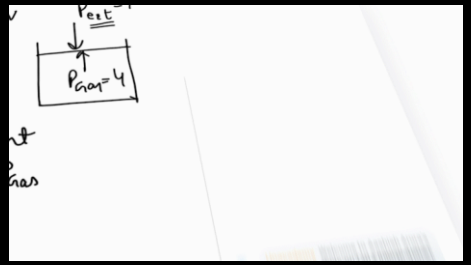


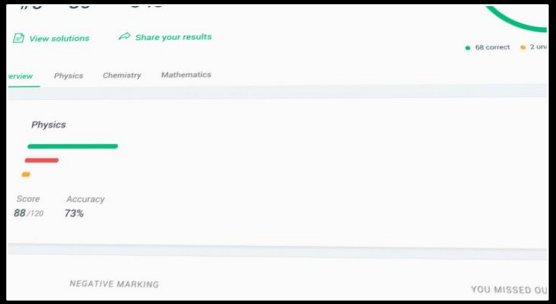
Unacademy Subscription

jee









+ LIVE Class Environment

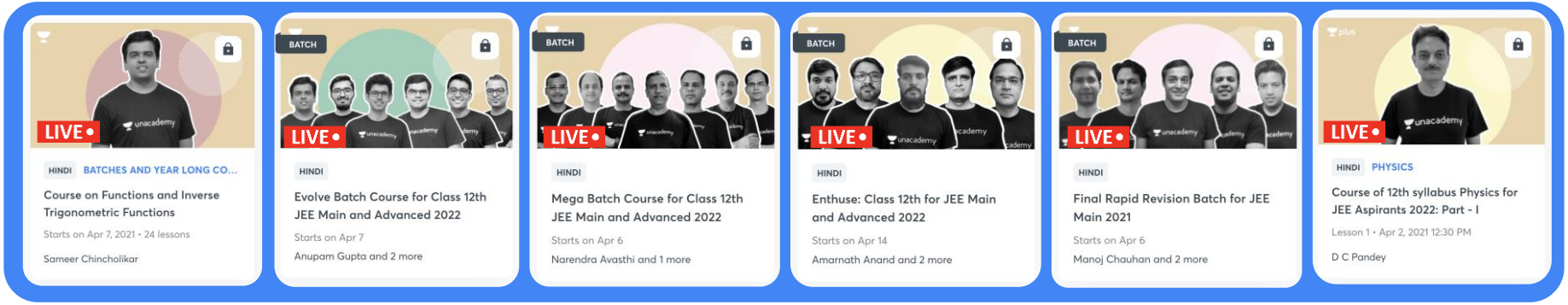
- + **LIVE Polls** & **Leaderboard**
- + **LIVE Doubt** Solving
- + **LIVE** Interaction

+ Performance Analysis

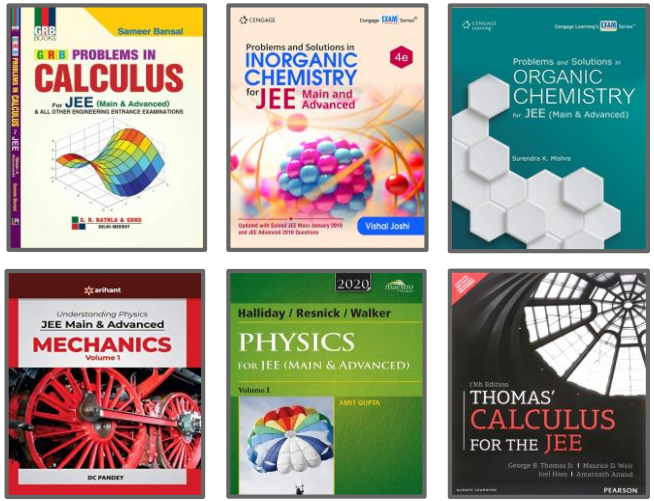
- + **Weekly Test Series**
- + **DPPs** & **Quizzes**

India's **BEST** Educators

Unacademy Subscription



If you want to be the **BEST**
"Learn" from the **BEST**



jee

Top Results

Bratin Mondal

100 %ile

Amaiya Singhal
99.97

Adnan
99.95

Ashwin Prasanth
99.94

Tanmay Jain
99.86

Kunal Lalwani
99.81

Utsav Dhanuka
99.75

Aravindan K Sundaram
99.69

Manas Pandey
99.69

Mihir Agarwal
99.63

Akshat Tiwari
99.60

Sarthak Kalankar
99.59

Vaishnovi Arun
99.58

Devashish Tripathi
99.52

Maroof
99.50

Tarun Gupta
99.50

Siddharth Kaushik
99.48

Mihir Kothari
99.39

Sahil
99.38

Vaibhav Dhanuka
99.34

Pratham Kadam
99.29

Shivam Gupta
99.46

Shrish
99.28

Yash Bhaskar
99.10

Subhash Patel
99.02

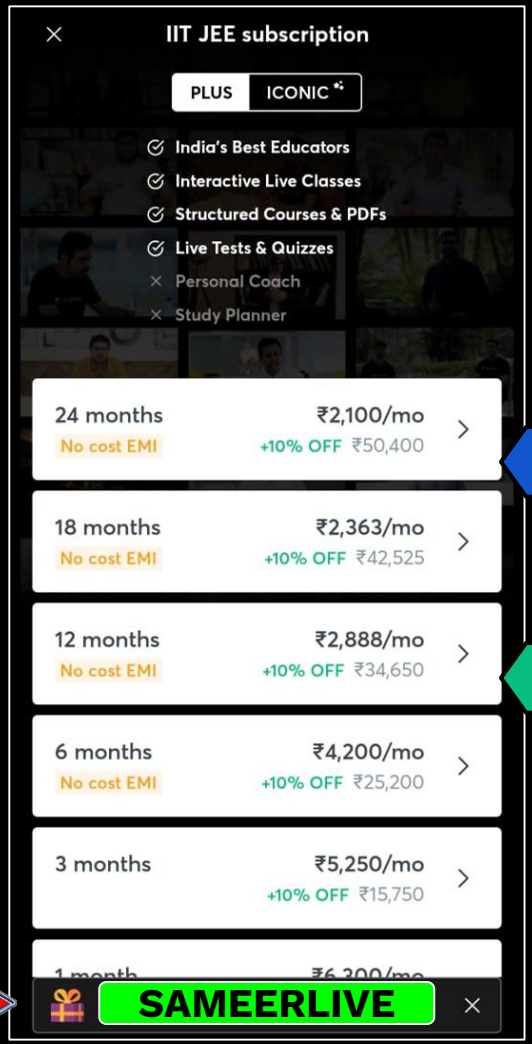
Ayush Kale
98.85

Ayush Gupta
98.67

Megh Gupta
98.59

Naman Goyal
98.48

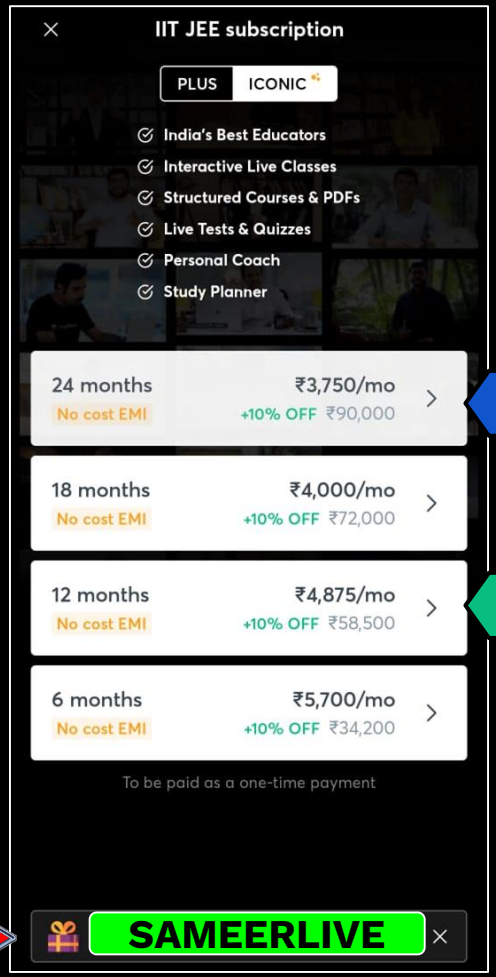
MIHIR PRAJAPATI
98.16



jee

11th / 9, 10

12th / Drop



11th / 9, 10

12th / Drop

jee

LET'S BEGIN!!

Location of Roots

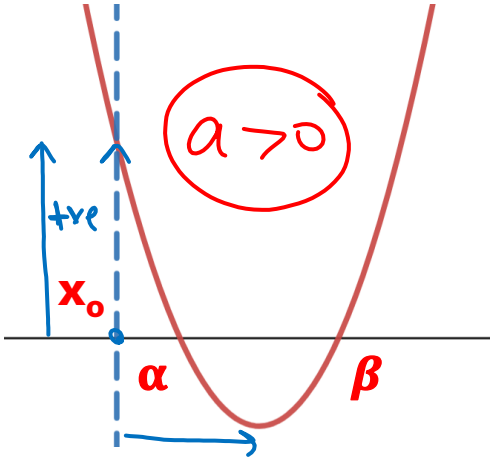
1. Both the roots are greater than x_0:

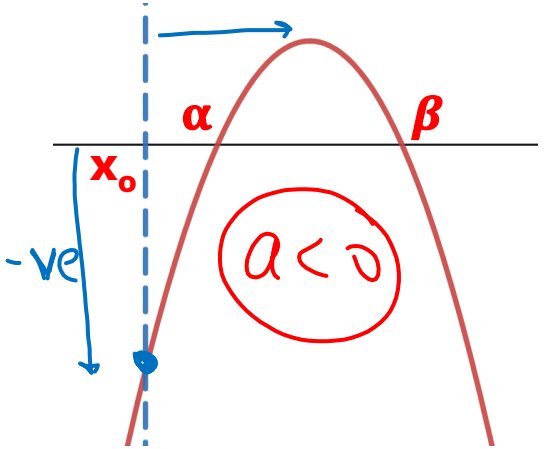
$f(x) = ax^2 + bx + c$

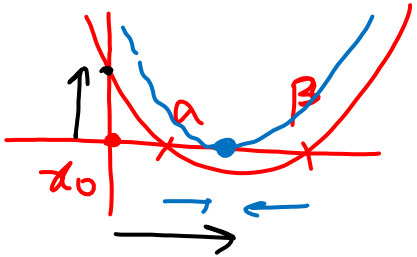
① $D \geq 0$

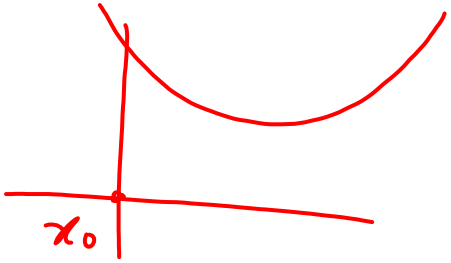
② $V_x > x_0$

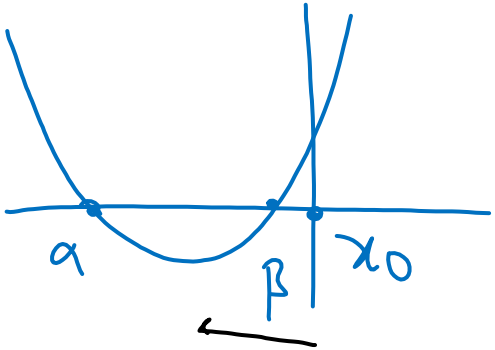
③ $a \cdot f(x_0) > 0$

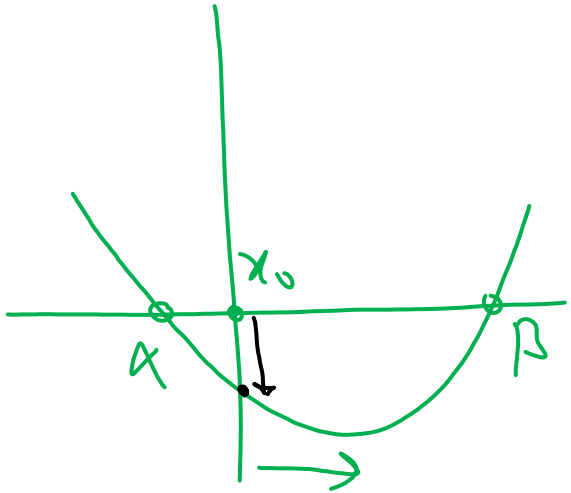


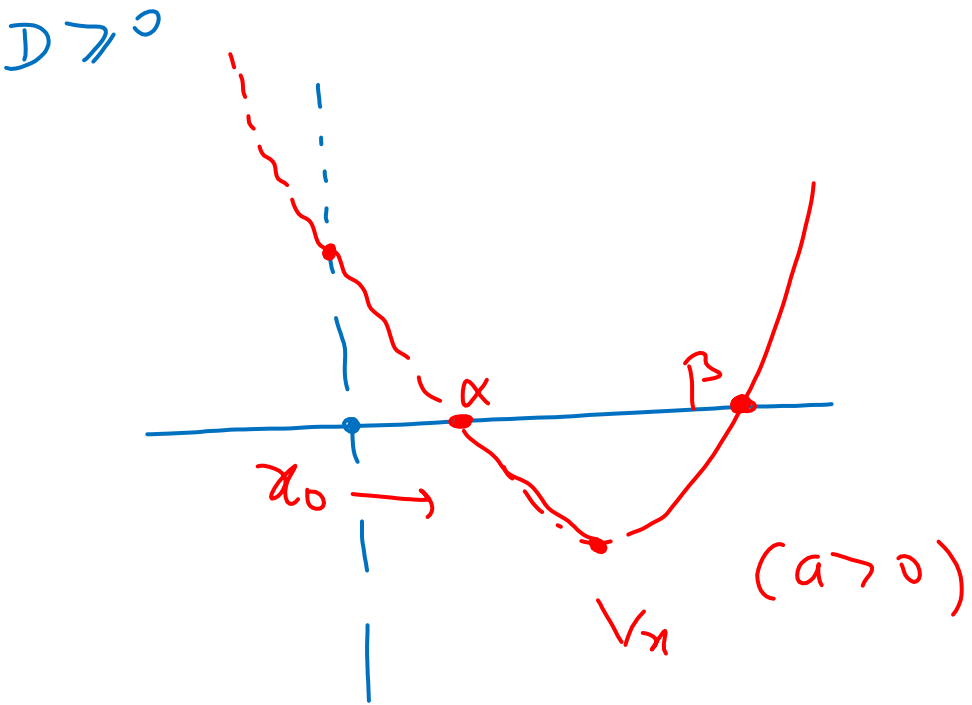



α
β
x_0


x_0


α
β
x_0


x_0
α
β


D ≥ 0
α
β
x_0
V_x
(a > 0)

The smallest integral value of k, for which both the roots of the equation $x^2 - 8kx + 16(k^2 - k + 1) = 0$ are real, distinct and have values at least 4, is

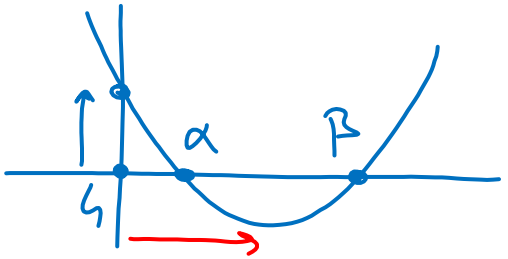
IIT-JEE 2009

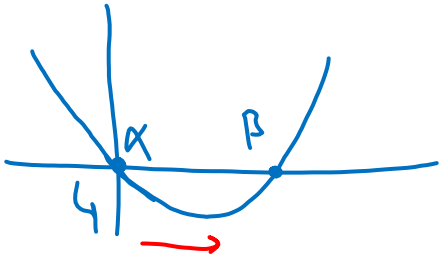
(1) $D > 0$

$64k^2 - 64(k^2 - k + 1) > 0$

$k^2 - k^2 + k - 1 > 0$

$k > 1$ — (1)





② $V_x > 4$

$$\frac{-(-8K)}{2(1)} > 4$$

$K > 1$ — ②

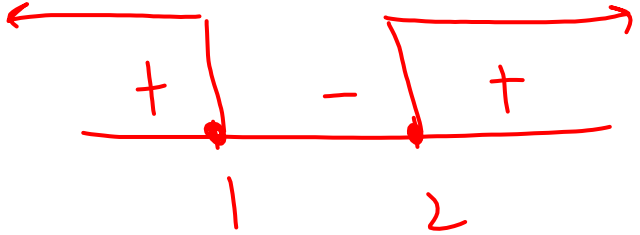
③ $a \cdot f(4) \geq 0$

$$1\left(16 - 32K + 16(K^2 - K + 1)\right) \geq 0$$

$$1 - 2K + K^2 - K + 1 \geq 0$$

$$K^2 - 3K + 2 \geq 0$$

$$(K-1)(K-2) \geq 0$$



$(1) \cap (2) \cap (3)$

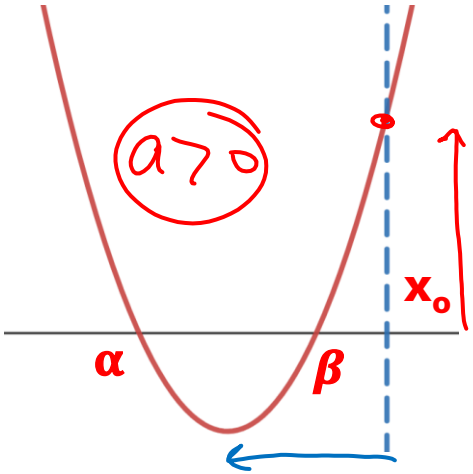
$\Rightarrow K \in [2, \infty)$

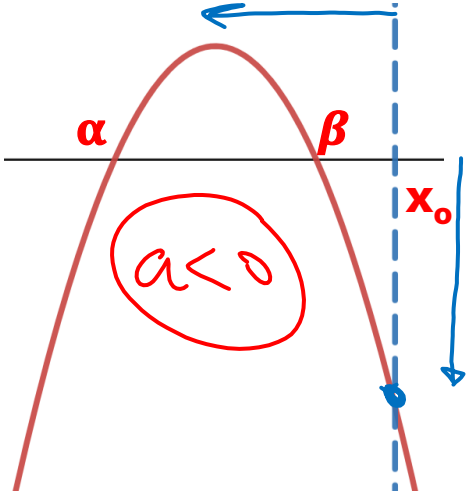
Smallest integral value is (2)

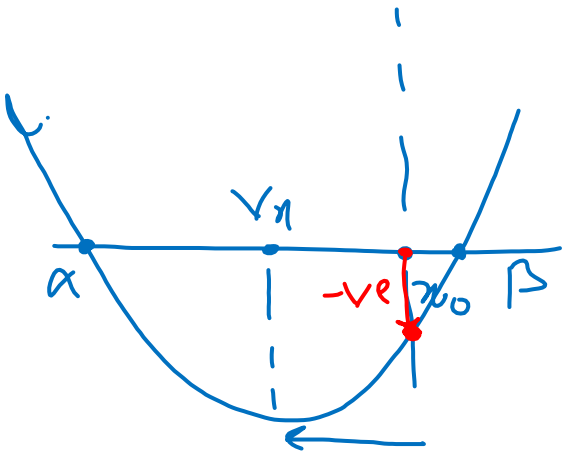
2. Both the roots are less than x_0:

$f(x) = ax^2 + bx + c$

1. $D \geq 0$
2. $V_x < x_0$
3. $a \cdot f(x_0) > 0$

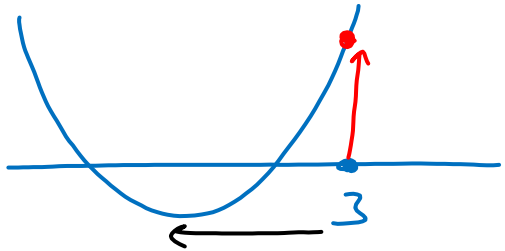





v_1
α
-ve
x_0
β

If the roots of the equation $x^2 - 2ax + a^2 + a - 3 = 0$ are real and less than 3, then :

A. $a < 2$
B. $2 < a < 3$
C. $3 \le a \le 4$
D. $a > 4$



① $D \geq 0$

$a^2 - (1)(a^2 + a - 3) \geq 0$

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

$a \leq 3$

② $V_x < 3$

$-\frac{(-2a)}{2(1)} < 3$

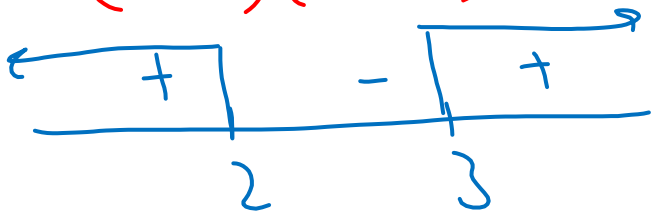
$a < 3$

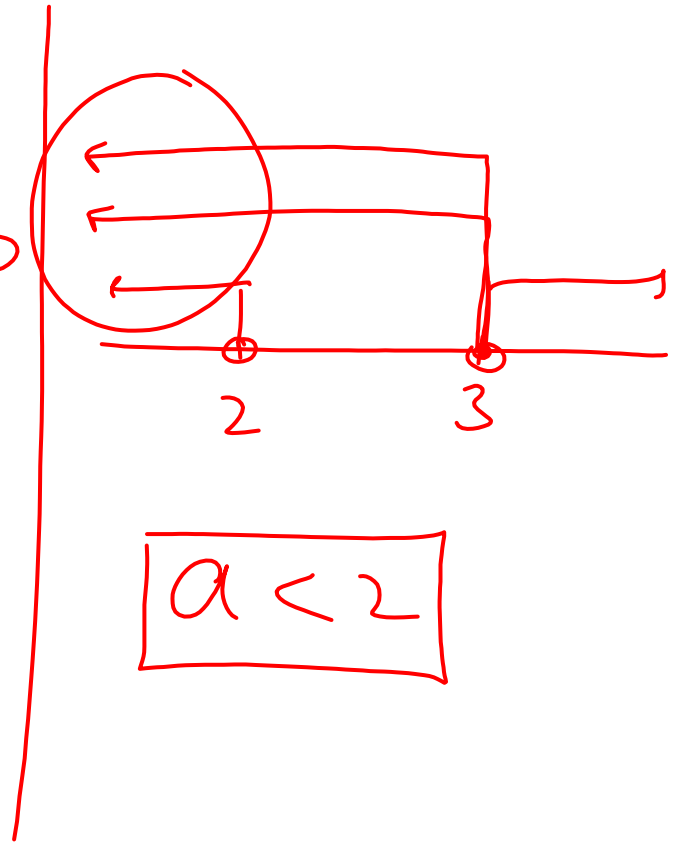
③ (1) $f(3) > 0$

$9 - 6a + a^2 + a - 3 > 0$

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

$(a-2)(a-3) > 0$



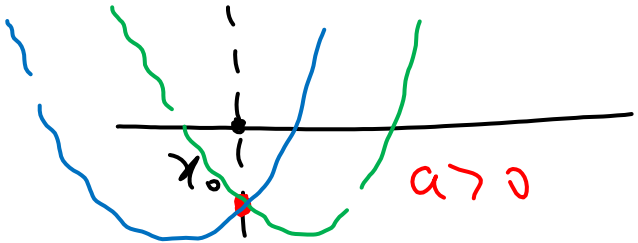


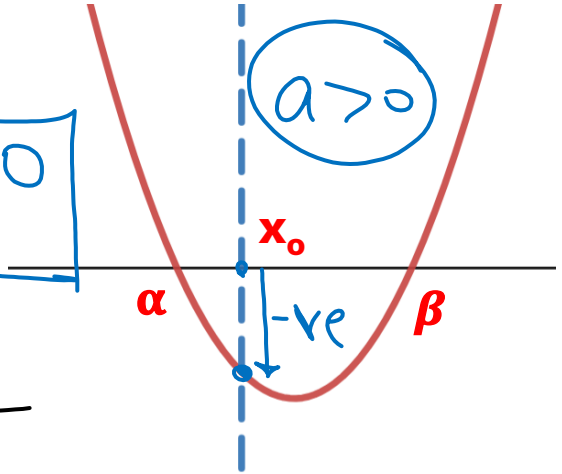
$a < 2$

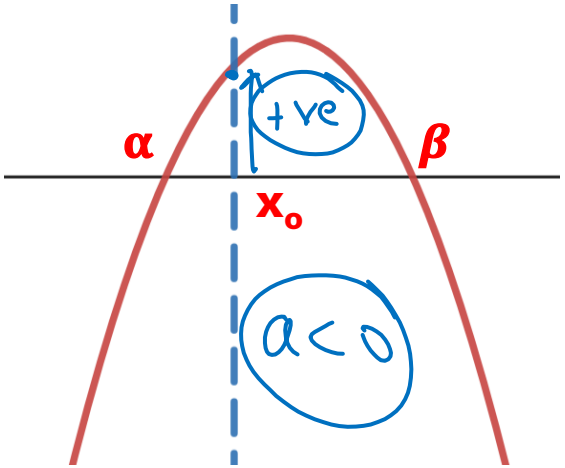
3. One root less than and other greater than x_0:

$$f(x) = ax^2 + bx + c$$

$a \cdot f(x_0) < 0$

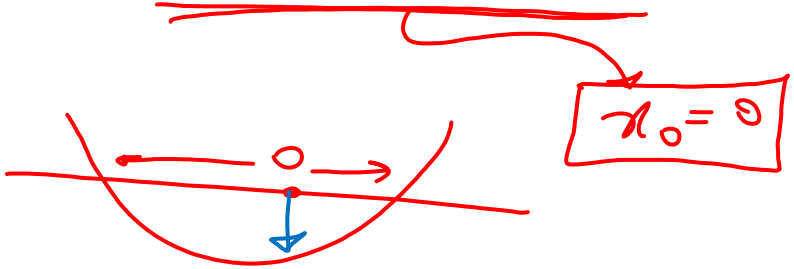






The values of a, for which the quadratic equation
$3x^2 + 2(a^2 + 1)x + (a^2 - 3a + 2) = 0$ possesses roots of opposite signs are:

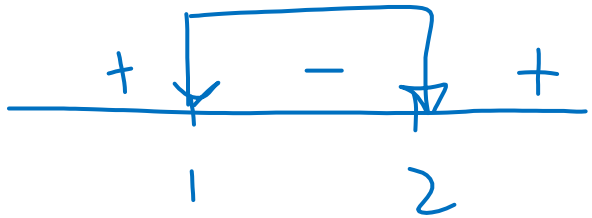
A. $1 < a < 2$
B. $a \in (2, \infty)$
C. $1 < a < 3$
D. None of these



$3(f(0)) < 0$

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

$(a-1)(a-2) < 0$



The values of a for which the equation $2x^2 - 2(2a + 1)x + a(a - 1) = 0$ has roots α and β satisfying the condition $\alpha < a < \beta$, are :

A. (-3, 0)

B. (0, ∞)

C. (-∞, -3) ∪ (0, ∞)

D. None of these

$\alpha < a < \beta$

$\Downarrow$

$x_0 = a$

(2) $f(a) < 0$

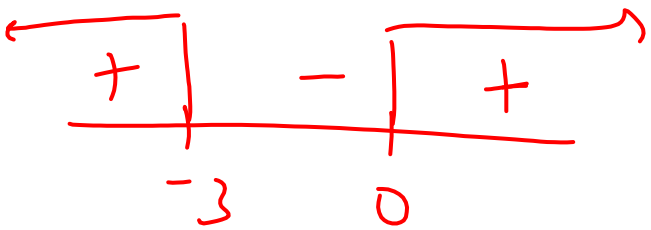
$2a^2 - 2(2a+1)a + a(a-1) < 0$

$2a^2 - 4a^2 - 2a + a^2 - a < 0$

$-a^2 - 3a < 0$

$a^2 + 3a > 0$

$$a(a+3) > 0$$

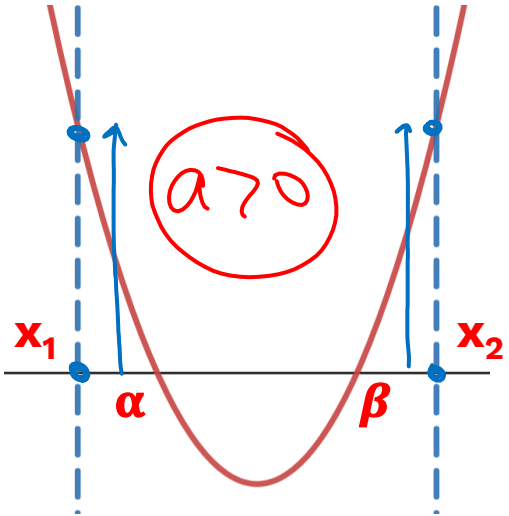


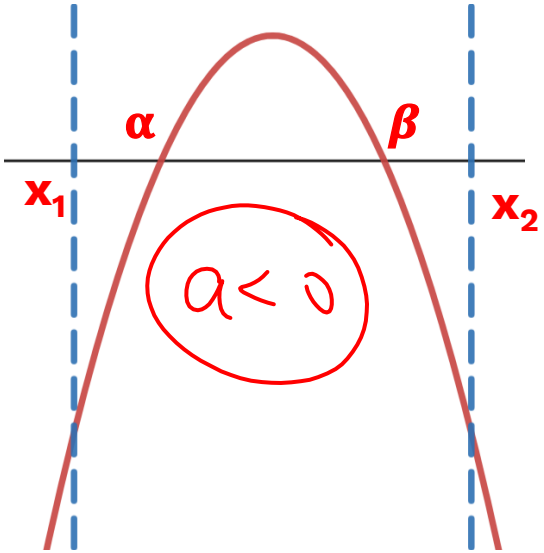
$$(-\infty, -3) \cup (0, \infty)$$

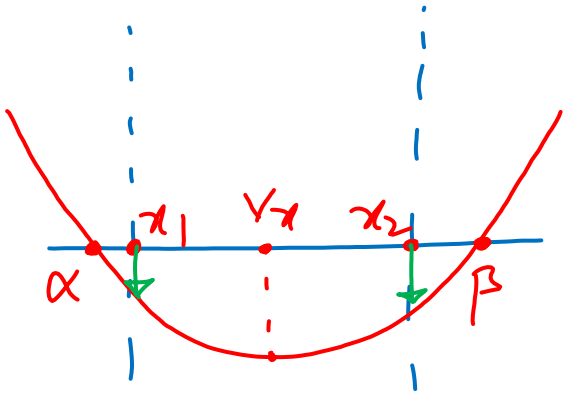
4. Both root between x_1 and x_2:

$f(x) = ax^2 + bx + c$

1. $D \geq 0$
2. $x_1 < V_x < x_2$
3. $a \cdot f(x_1) > 0$
4. $a \cdot f(x_2) > 0$







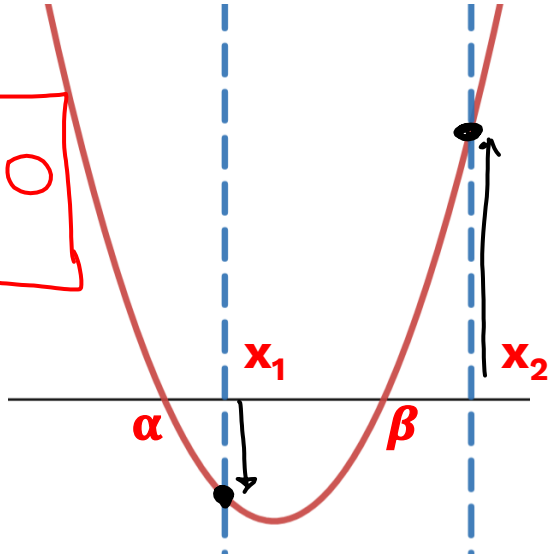
$$f(x_1)\,f(x_2) > 0$$

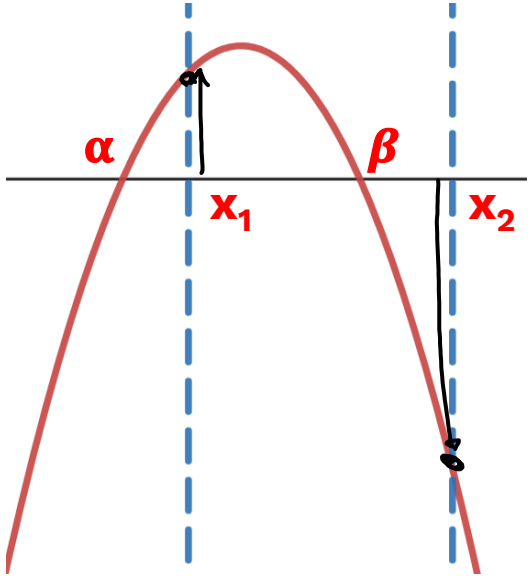
✗

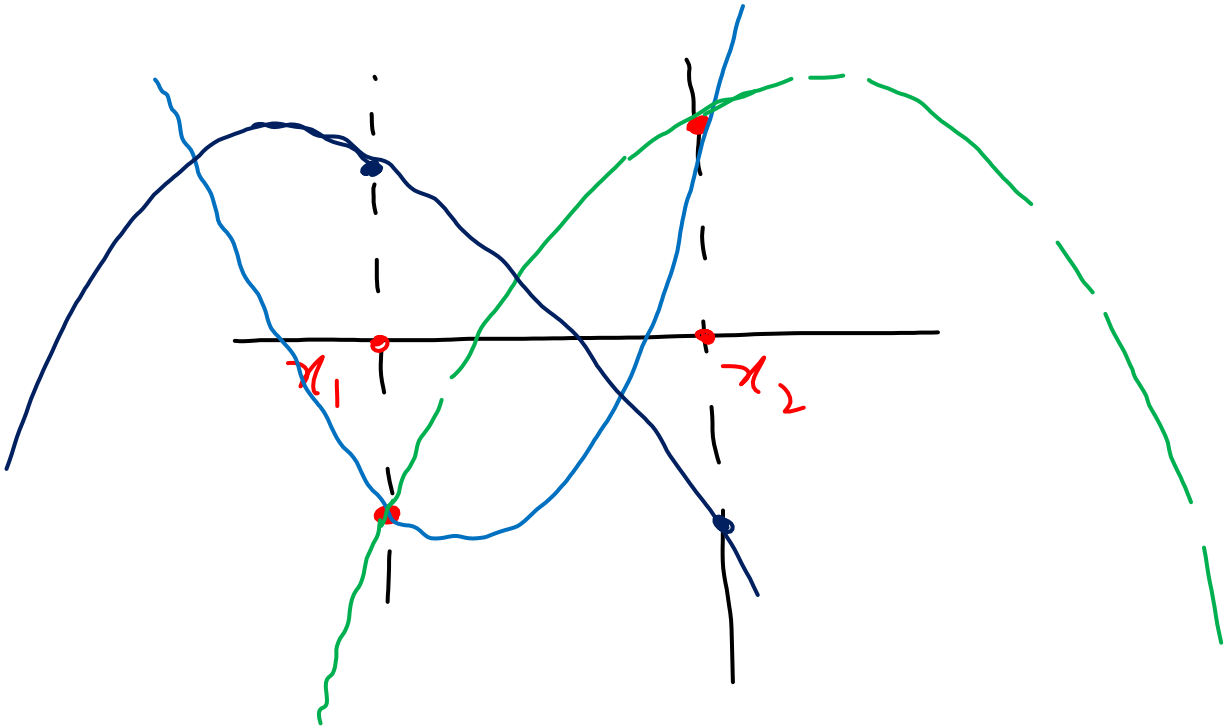
5. Exactly one root between x_1 and x_2:

$f(x) = ax^2 + bx + c$

$f(x_1) \cdot f(x_2) < 0$





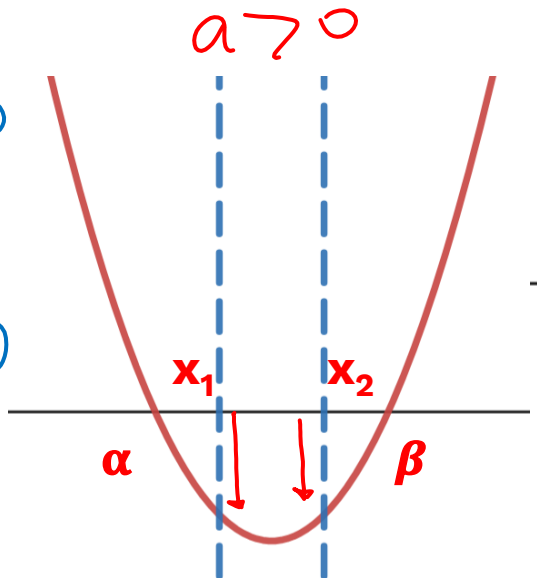

x_1
x_2

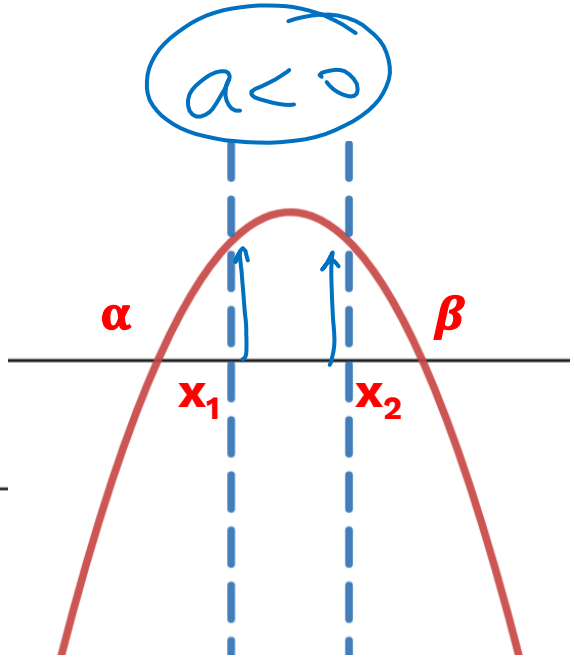
6. Both roots outside x_1 and x_2:

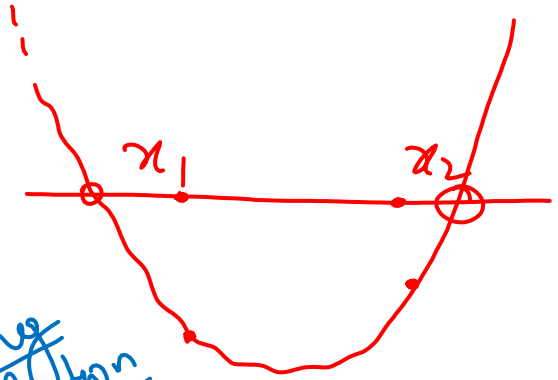
$f(x) = ax^2 + bx + c$

① $a \cdot f(x_1) < 0$

② $a \cdot f(x_2) < 0$

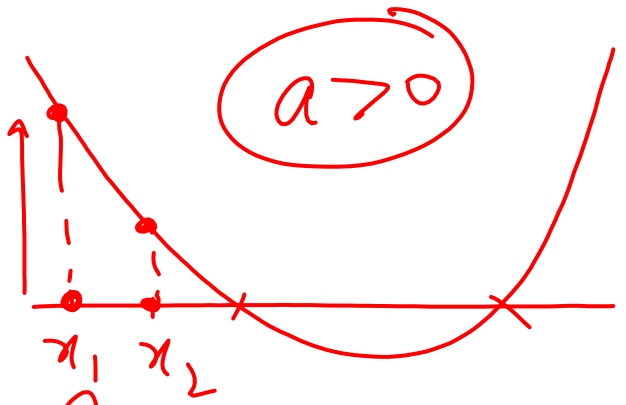






Wrong condition

$\longrightarrow f(x_1) \cdot f(x_2) > 0$



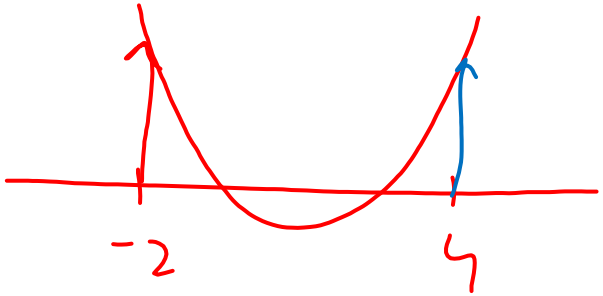
All the values of **m** for which both roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ are **greater than - 2 but less than 4**, lie in the interval

A. $-2 < m < 0$

B. $m > 3$

C. $-1 < m < 3$

D. $1 < m < 4$



(1) $D \geq 0$

$4m^2 - 4(m^2 - 1) \geq 0$

$m^2 - m^2 + 1 \geq 0$

$1 \geq 0 \Rightarrow m \in R$

(2) $-2 < \frac{-(-2m)}{2(1)} < 4$

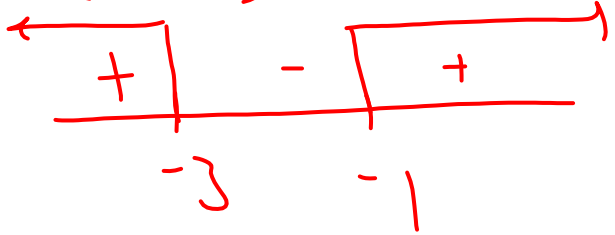
$-2 < m < 4$

③ (1) $f(-2) > 0$

$4 + 4m + m^2 - 1 > 0$

$m^2 + 4m + 3 > 0$

$(m+3)(m+1) > 0$

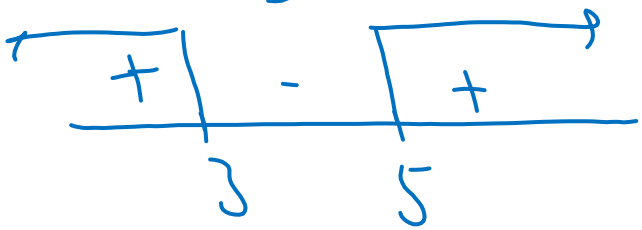


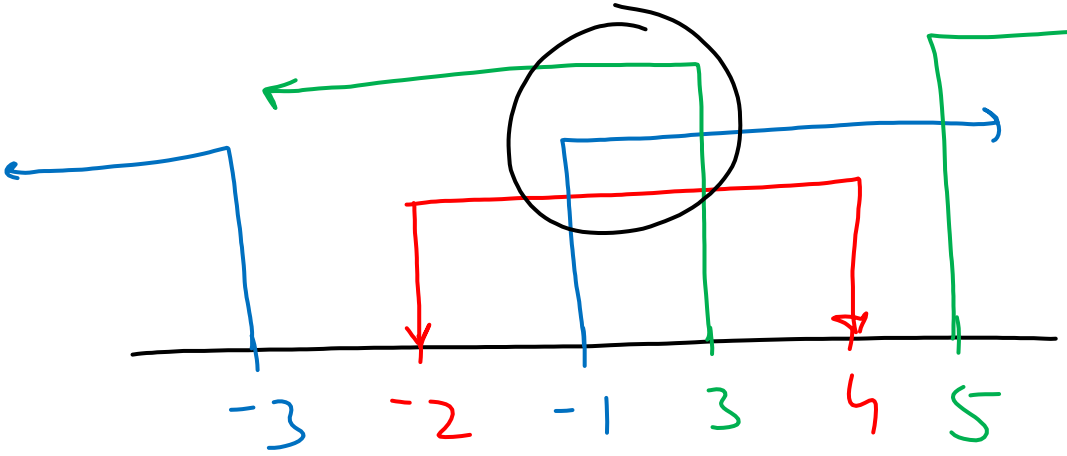
④ (1) $f(4) > 0$

$16 - 8m + m^2 - 1 > 0$

$m^2 - 8m + 15 > 0$

$(m-3)(m-5) > 0$





$-1 < m < 3$

M-2 :

$(x-m)^2 - 1^2 = 0$

$(x-m+1)$

$(x-m-1) = 0$

$x = m-1$

$x = m+1$

Homework Question L-6

Show that the expression $\frac{mx^2 + 3x - 4}{m + 3x - 4x^2}$ will be capable of all values when x is real, provided that m has any value between 1 and 7.

$y \in R$

$y = \frac{mx^2+3x-4}{m+3x-4x^2}$

$my + 3yx - 4yx^2 = mx^2 + 3x - 4$

$(m+4y)x^2 + (3-3y)x - (4+my) = 0$

$x \in R$, $D \geq 0$

$(3-3y)^2 + 4(m+4y)(4+my) \geq 0$

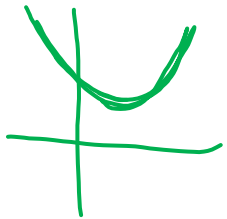
$$(9+9y^2-18y)+4(4m+m^2y+16y+4my^2)\geq 0$$

$$\Rightarrow (9+16m)y^2+(-18+4m^2+64)y+(9+16m)\geq 0$$

Now; $y\in R \Rightarrow \boxed{D\leq 0}$ & $\boxed{(9+16m)>0}$

$$(4m^2+46)^2-4(9+16m)(9+16m)\leq 0$$

$$\Rightarrow (2m^2+23)^2-(9+16m)^2\leq 0$$

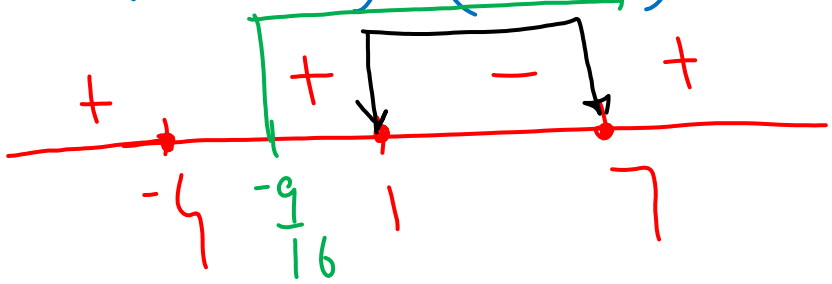


$$\Rightarrow (2m^2+23+9+16m)(2m^2+23-9-16m) \leq 0$$

$$\Rightarrow (2m^2+16m+32)(2m^2-16m+14) \leq 0$$

$$\Rightarrow 4(m^2+8m+16)(m^2-8m+7) \leq 0$$

$$\Rightarrow 4(m+4)^2(m-1)(m-7) \leq 0$$



$$\therefore m \in [1,7]$$

#JEELiveDaily Schedule

jee

11th

Namo Sir | Physics

6:00 - 7:30 PM

Ashwani Sir | Chemistry

7:30 - 9:00 PM

Sameer Sir | Maths

9:00 - 10:30 PM

12th

Jayant Sir | Physics

1:30 - 3:00 PM

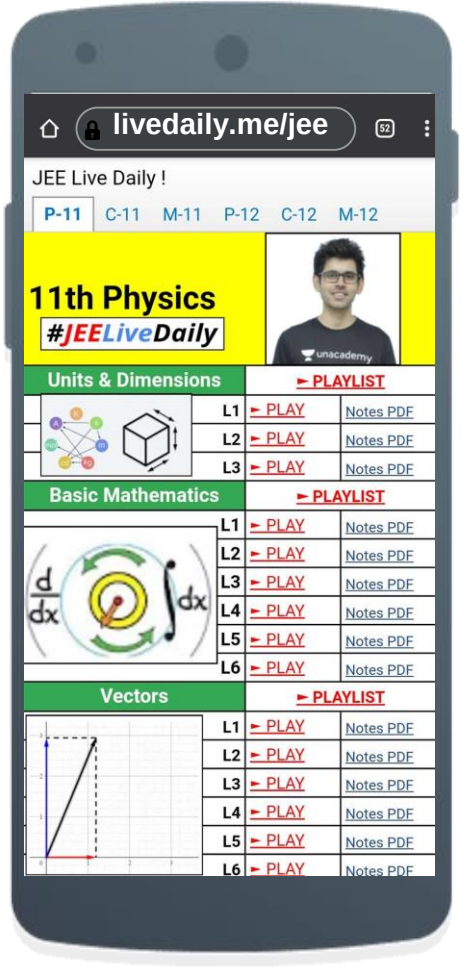
Anupam Sir | Chemistry

3:00 - 4:30 PM

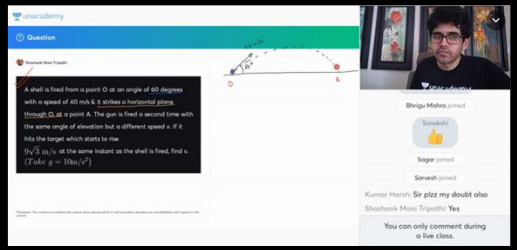
Nishant Sir | Maths

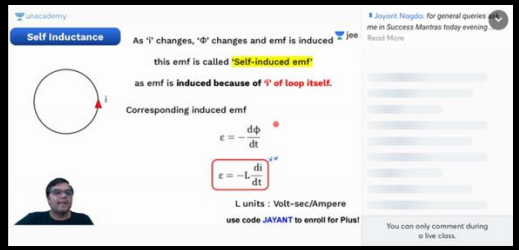
4:30 - 6:00 PM

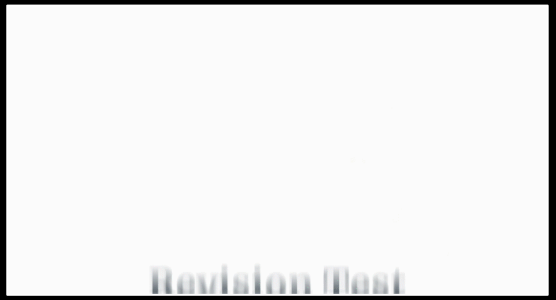
livedaily.me/jee

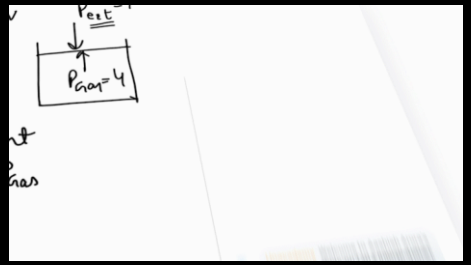


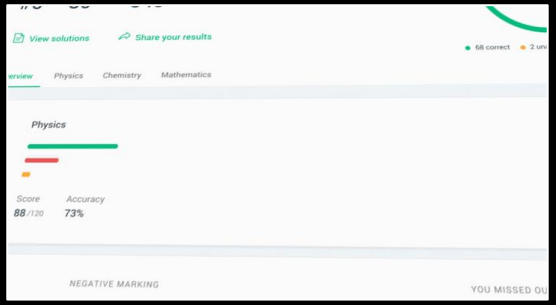
Unacademy Subscription











+ LIVE Class Environment

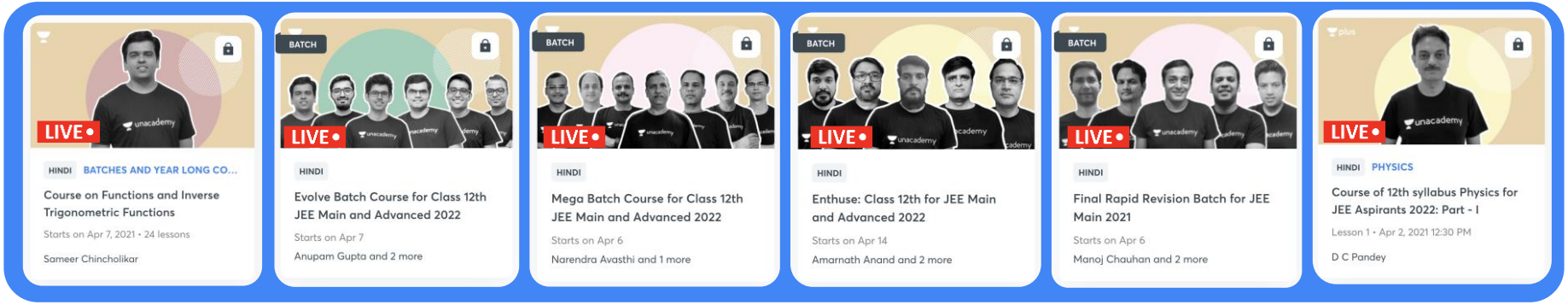
- **LIVE Polls** & **Leaderboard**
- **LIVE Doubt** Solving
- **LIVE** Interaction

+ Performance Analysis

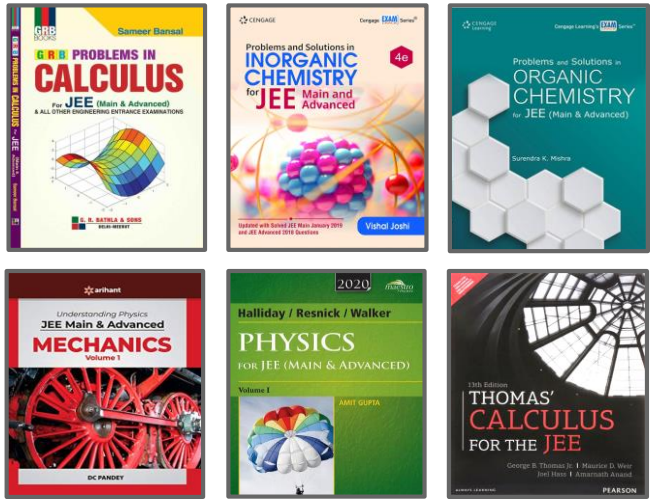
- **Weekly Test Series**
- **DPPs** & **Quizzes**

India's **BEST** Educators

Unacademy Subscription



If you want to be the **BEST**
"Learn" from the **BEST**



jee

Top Results

Bratin Mondal

100 %ile

Amaiya Singhal
99.97

Adnan
99.95

Ashwin Prasanth
99.94

Tanmay Jain
99.86

Kunal Lalwani
99.81

Utsav Dhanuka
99.75

Aravindan K Sundaram
99.69

Manas Pandey
99.69

Mihir Agarwal
99.63

Akshat Tiwari
99.60

Sarthak Kalankar
99.59

Vaishnovi Arun
99.58

Devashish Tripathi
99.52

Maroof
99.50

Tarun Gupta
99.50

Siddharth Kaushik
99.48

Mihir Kothari
99.39

Sahil
99.38

Vaibhav Dhanuka
99.34

Pratham Kadam
99.29

Shivam Gupta
99.46

Shrish
99.28

Yash Bhaskar
99.10

Subhash Patel
99.02

Ayush Kale
98.85

Ayush Gupta
98.67

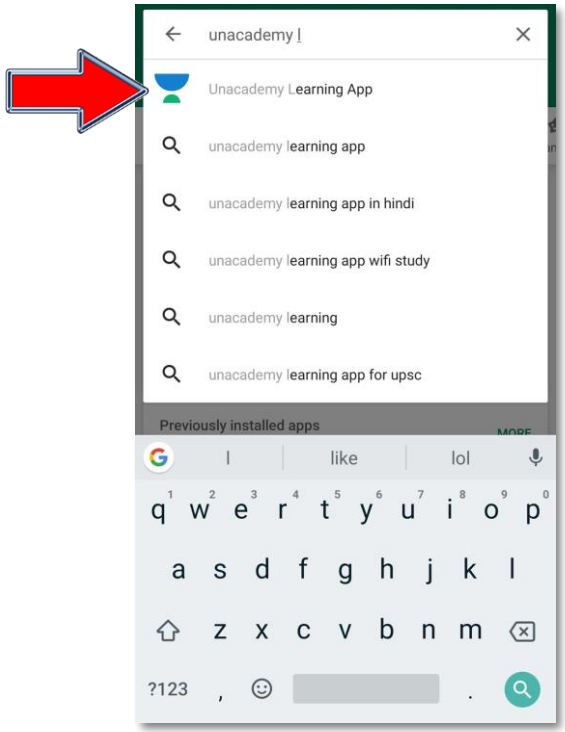
Megh Gupta
98.59

Naman Goyal
98.48

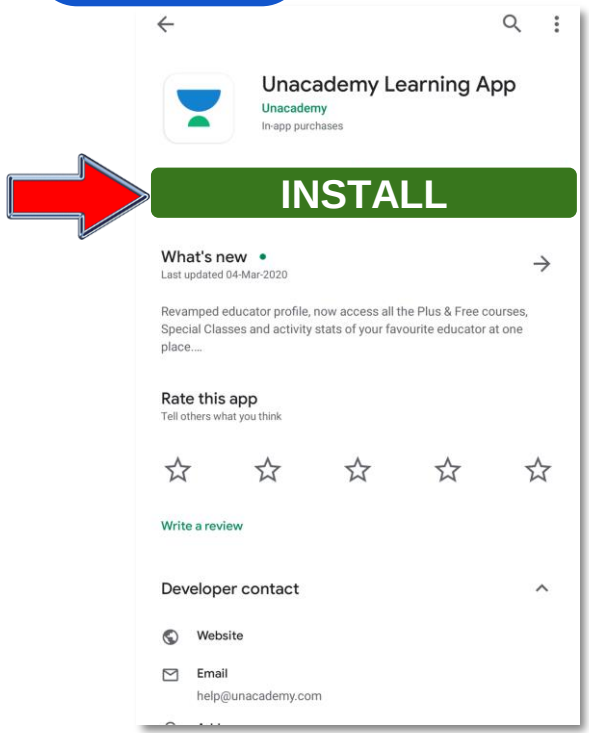
MIHIR PRAJAPATI
98.16

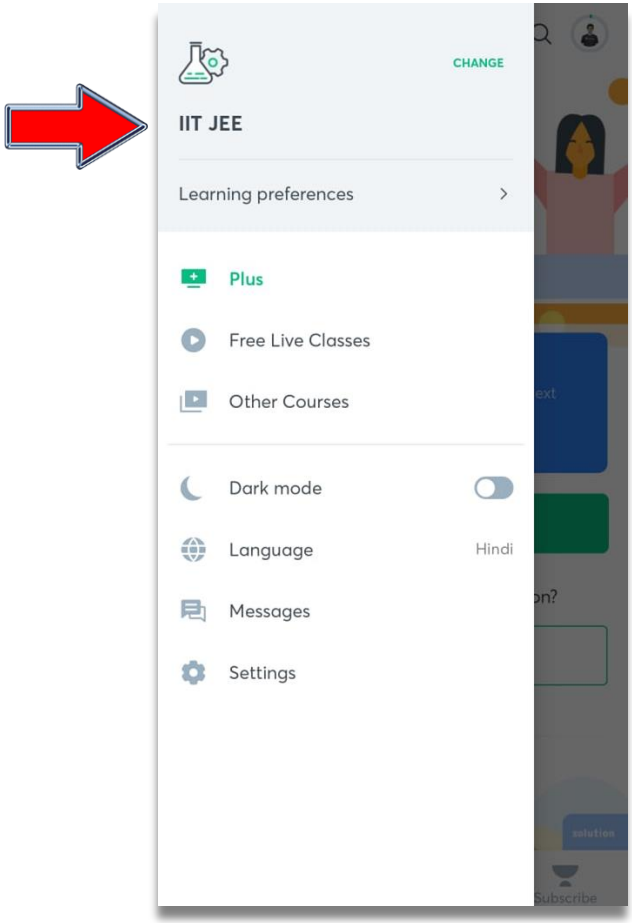
jee

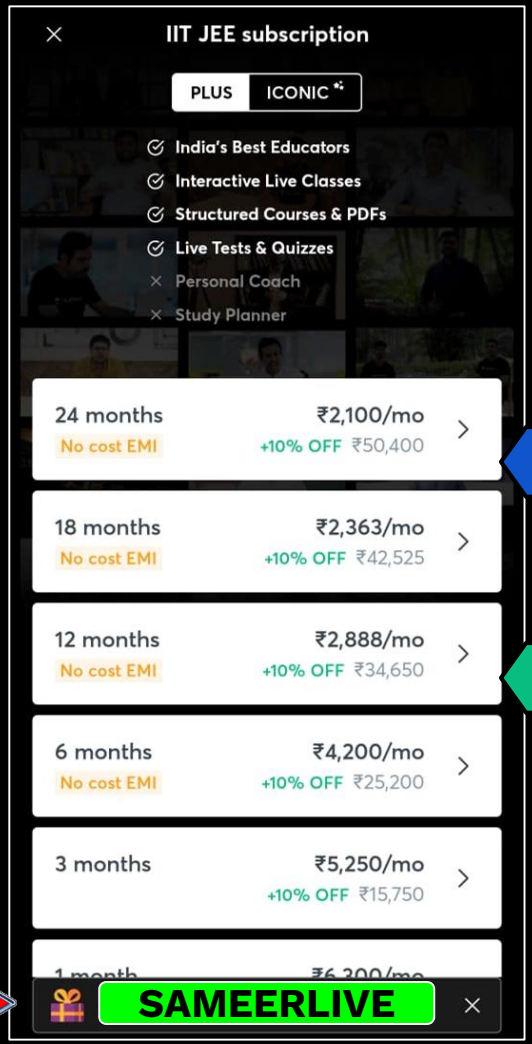
Step 1



Step 2



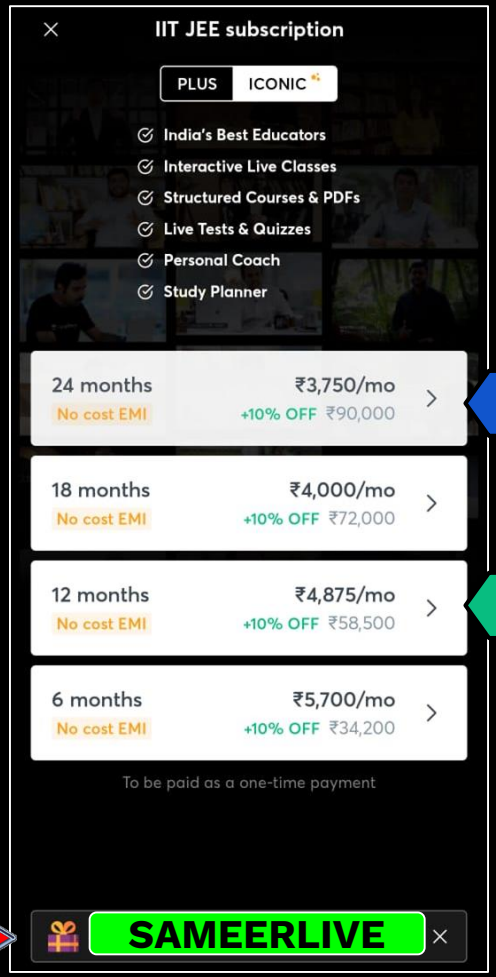

CHANGE
IIT JEE
Learning preferences
Plus
Free Live Classes
Other Courses
Dark mode
Language
Hindi
Messages
Settings



jee

11th / 9, 10

12th / Drop



11th / 9, 10

12th / Drop

jee

unacademy

IIT JEE BUMPER OFFER

12 MONTHS

3 MONTHS SUBSCRIPTION FREE TILL IIT JEE 2022

24 MONTHS

4 MONTHS SUBSCRIPTION FREE TILL IIT JEE 2023

3 MONTHS

1 MONTHS SUBSCRIPTION FREE TILL IIT JEE 2021

unacademy

ALL STARS BATCH FOR JEE MAIN 2021

Batch Starting from 9th June

unacademy

jee LIVE daily

Test Series 2022

Test Series 2023

9th & 23rd June | 9 AM to 12 PM

jee

EMERGE 3.0 BATCH

JEE Main & Advanced 2023

Started on 12th May

Upcoming Batches in June

unacademy

Nurture 2.0 Batch (Class 11th) : JEE Main & Advanced 2023 — Starts on 2nd June 2021

Evolve Batch (Class 12th) : JEE Main & Advanced 2022 — Starts on 2nd June 2021

Emerge Batch (Class 11th) : JEE Main & Advanced 2023 — Starts on 8th June 2021

Evolve Batch (Class 12th) : JEE Main & Advanced 2022 — Starts on 9th June 2021

All Stars Batch : JEE Main 2021 — Starts on 9th June 2021

Emerge Batch (Class 11th) : JEE Main & Advanced 2023 — Starts on 16th June 2021

UNACADEMY COMBAT
COMPETE. CRACK. CONQUER.

INDIA'S BIGGEST WEEKLY SCHOLARSHIP TEST

For IIT-JEE Aspirants

SCAN NOW TO ENROLL

Enroll for **Free**

Win **Scholarship** from a pool of

₹ 4 Crore

Terms and conditions apply*

Take it live from **android**

IIT-JEE COMBAT

Every Sunday at 11 AM

To unlock, use code

SAMEERLIVE

Rank 1 - 3

1 year IIT-JEE Plus Subscription

Rank 4 - 10

75% Scholarship

Rank 11 - 50

50% Scholarship

Rank 51 - 150

25% Scholarship

Thank You

+ SUBSCRIBE

@sameer_iitr

#JEE Live Daily

jee

LIKE & SHARE

PDF Download Now !