PRAYAS

JEE 2026

Mathematics

Basic Maths

Lecture - 06

By – Ashish Agarwal Sir
(IIT Kanpur)

Topics *to be covered*

- **A** Problem Practice
- **B** Algebraic Identities
- **C** Laws of Exponent

Homework Discussion

QUESTION

If $81x^5 + 27x^3 - 9x^2 + 50$ is divided by $(3x + 2)$ then remainder is λ then

(A) $\frac{3\lambda-42}{10}$ is equal to 4

(B) if $\lambda = \frac{p}{q}$ then $(p + q)$ is divisible by 17 (where p & q are coprime)

(C) λ is a natural number

(D) $\left(\lambda - \frac{1}{3}\right)$ is divisible by 3

Ans. A, B, D

QUESTION

Let $f(x) = x^{135} + x^{125} - x^{115} + x^5 + 1$. If $f(x)$ is divided by $x^3 - x$ then the remainder is some function of x say $g(x)$. Find the value of $g(10)$.

$$f(x) = (x^3 - x) \cdot Q(x) + ax^2 + bx + c \qquad g(x) = ax^2 + bx + c$$

$$f(x) = x(x-1)(x+1) \cdot Q(x) + ax^2 + bx + c$$

Put $x=1$, $f(1) = a + b + c$

$f(0) = c$

$f(-1) = a - b + c$

$a = 0$

$b = 2$

$c = 1$

Ans. 21

QUESTION

If p(x) is a polynomial of 3 degree for which p(1) = 1, p(2) = 4, p(3) = 9 then find the value of p(5) and leading coefficient be 2.

degree 3

$$g(x) = P(x) - x^2$$

$$g(1) = g(2) = g(3) = 0$$

$$g(x) = 2(x-1)(x-2)(x-3)$$

$$P(x) - x^2 = 2(x-1)(x-2)(x-3)$$

$$P(x) = 2(x-1)(x-2)(x-3) + x^2$$

Ans. 73

Aao Machaay Dhamaal
Deh Swaal pe Deh Swaal

QUESTION

$y^2 + 2\cdot 3\cdot y$

Three real numbers x, y, z are such that $x^2 + 6y = -17$, $y^2 + 4z = 1$ and $z^2 + 2x = 2$. Then the value of $x^3 + y^3 + z^3$ is equal to

(A) 30

(B) –24

(C) –36

(D) –28

$x^2 + y^2 + z^2 + 6y + 4z + 2x = -14$

$x^2 + 2x + 1 + y^2 + 6y + 9 + z^2 + 4z + 4 = -14 + 14$

$(x+1)^2 + (y+3)^2 + (z+2)^2 = 0$

$x = -1,\ y = -3,\ z = -2$

All 3 satisfied

$x^3 + y^3 + z^3 = -1 - 27 - 8 = -36.$

QUESTION

Suppose that $w = 2^{1/2}$, $x = 3^{1/3}$, $y = 6^{1/6}$ and $z = 8^{1/8}$. From among these number list, the biggest, second biggest numbers are

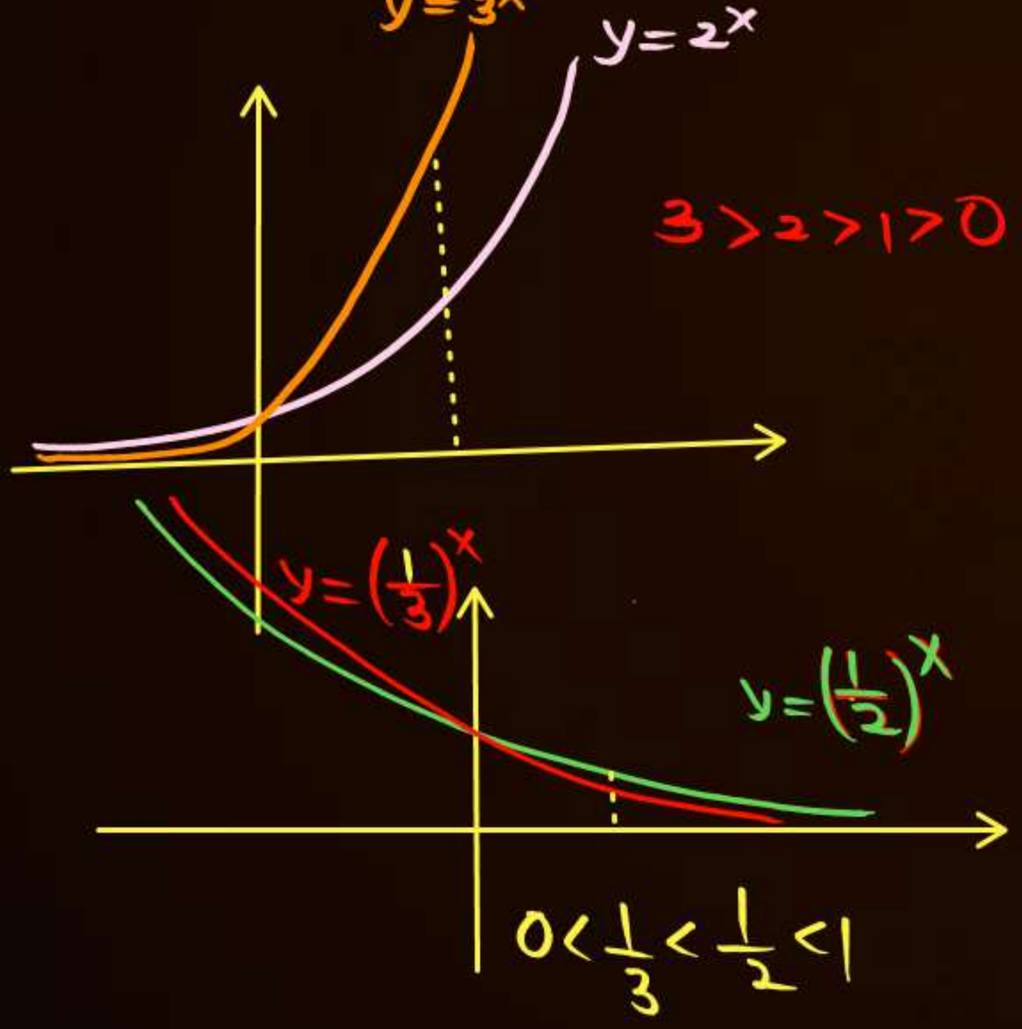
(A) w, x

(B) x, w

(C) y, z

(D) x, z

ADBST



$3>2>1>0$

* $0<a<1$ $\quad a^x \downarrow$ as $x \uparrow$

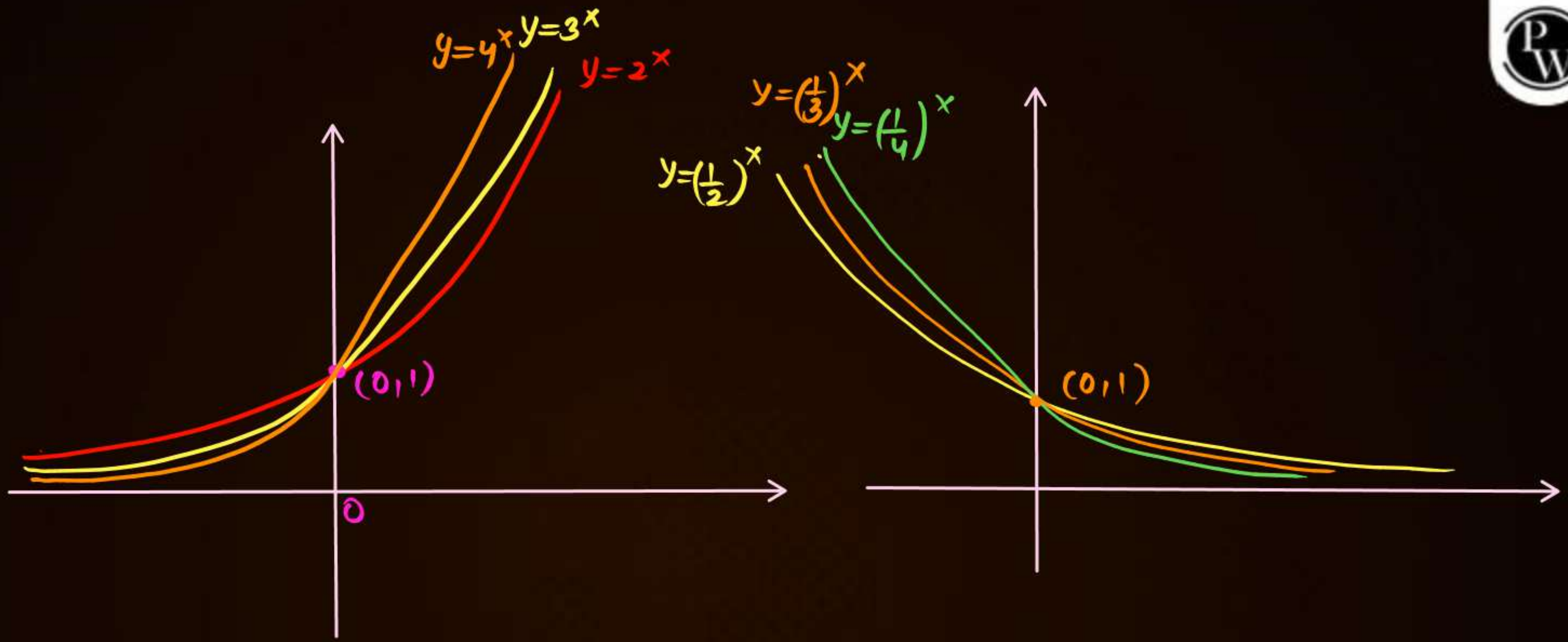
* $a>1$ $\quad a^x \uparrow$ as $x \uparrow$

(1) $a>b>0 \Rightarrow a^x > b^x$ $\quad x>0$ – (True)

(2) $a>b>1 \Rightarrow a^{-x} < b^{-x}$ $\quad x>0$ – True

(3) $0<\underbrace{b}_{\frac{1}{3}}<\underbrace{a}_{\frac{1}{2}}<1 \Rightarrow \underbrace{a^{-x}}_{-\text{ve power}} < \underbrace{b^{-x}}_{-\text{ve power}}$, $x>0$ – True

(4) $0<b<a<1 \Rightarrow a^x > b^x$ $\quad (x>0)$ (True)



$y=4^x$
$y=3^x$
$y=2^x$
$(0,1)$
0
$y=\left(\frac{1}{3}\right)^x$
$y=\left(\frac{1}{4}\right)^x$
$y=\left(\frac{1}{2}\right)^x$
$(0,1)$

QUESTION

$lcm(1,2,3)=6$ $\quad 6\left(\frac{\lambda}{6}\right)$ 6μ

If a, b & c are three non zero real numbers such that $4a^2 + 9b^2 + c^2 - 6ab - 3bc - 2ca = 0$ then the value of $(4a + c)/b$ is equal to

$$4a^2+9b^2+c^2-6ab-3bc-2ca=0$$

$$(2a)^2+(3b)^2+c^2-2a\cdot 3b-3b\cdot c-c\cdot 2a=0$$

$$2a=3b=c=6\lambda$$

$$a=3\lambda,\quad b=2\lambda,\quad c=6\lambda \Rightarrow \frac{4a+c}{b}=\frac{12\lambda+6\lambda}{2\lambda}=9.$$

QUESTION

If a, b, c ∈ R then find the minimum value of $E = a^2 + 9b^2 + 25c^2 + 2a + 6b - 10c + 20$.

$$E = a^2 + 2a \quad + 9b^2 + 6b \quad + 25c^2 - 10c \quad + 20$$

$$E = a^2 + 2a + 1^2 + (3b)^2 + 2 \cdot 3b \cdot 1 + 1^2 + (5c)^2 - 2 \cdot 5c \cdot 1 + 1^2 + 20 - 3$$

$$= \underbrace{(a+1)^2}_{\geq 0} + \underbrace{(3b+1)^2}_{\geq 0} + \underbrace{(5c-1)^2}_{\geq 0} + 17$$

$E_{min} = 17$ at $a = -1$

$b = -1/3$

$c = 1/5$.

QUESTION

Tah 01

The number of real number pairs (x, y) which will satisfy the equation $x^2 - xy + y^2 = 4(x + y - 4)$ is

Ans. 1

QUESTION

If α, β and γ are roots of cubic equation $x^3 + 3x - 1 = 0$ then find value of:

(i) $(2-\alpha)(2-\beta)(2-\gamma)$

(ii) $(3+\alpha)(3+\beta)(3+\gamma)$

(iii) $(4-\alpha^2)(4-\beta^2)(4-\gamma^2)$

(iv) $(1+\alpha^2)(1+\beta^2)(1+\gamma^2)$

$x^3+3x-1 \to \alpha, \beta, \gamma$

$x^3+3x-1 = (x-\alpha)(x-\beta)(x-\gamma)$

for (i) put $x=2$

for (ii) put $x=-3$

$-27-9-1 = (-3-\alpha)(-3-\beta)(-3-\gamma)$

$-37 = -(3+\alpha) \cdot -(3+\beta) \cdot -(3+\gamma)$

$-37 = -(3+\alpha)(3+\beta)(3+\gamma)$

$(3+\alpha)(3+\beta)(3+\gamma) = 37$

for (iii)

put $x=2$

$(2-\alpha)(2-\beta)(2-\gamma) = 13$ — (I)

put $x=-2$

$(-2-\alpha)(-2-\beta)(-2-\gamma) = -15$

$(2+\alpha)(2+\beta)(2+\gamma) = 15$ — (II)

$(4-\alpha^2)(4-\beta^2)(4-\gamma^2) = 195$ Ans.

$i=\sqrt{-1} \Rightarrow i^2=-1$

$i^3 = i \times i \times i = -i$

$(-i)^3 = -i \times -i \times -i = -(i \times i \times i) = i$

$(2i)^2 = 2i \times 2i = 4 \times i^2 = 4 \times -1 = -4$

$*\quad x^2+y^2 = x^2-(iy)^2 = (x+iy)(x-iy)$

$*\quad 1+a^2 = (1+ia)(1-ia) = (a+i)(a-i)$

for (iv)

put $x=i$, put $x=-i$

$-i \quad i^3+3i-1 = (i-\alpha)(i-\beta)(i-\gamma) \Rightarrow 2i-1 = (i-\alpha)(i-\beta)(i-\gamma)$ — (I)

$+i \quad (-i)^3 - 3i - 1 = (-i-\alpha)(-i-\beta)(-i-\gamma) \Rightarrow -2i-1 = -(i+\alpha)(i+\beta)(i+\gamma)$

$2i+1 = (i+\alpha)(i+\beta)(i+\gamma)$ — (II)

(I).(II) $\quad (2i)^2-1^2 = (i^2-\alpha^2)(i^2-\beta^2)(i^2-\gamma^2)$

$-5 = -(1+\alpha^2) \cdot -1 \cdot (1+\beta^2) \cdot -1\,(1+\gamma^2)$

$(1+\alpha^2)(1+\beta^2)(1+\gamma^2) = 5.$

Factorization of Polynomial

Ex: $P(x) = x^3 - 6x^2 + 11x - 6$

$P(1) = 1 - 6 + 11 - 6 = 0 \Rightarrow (x-1)$ is a factor

$$x^3 - 6x^2 + 11x - 6 = (x-1)(x-2)(x-3)$$

$$x^3 + 6x^2 + 11x + 6 = (x+1)(x+2)(x+3)$$

$$P(x) = x^2(x-1) - 5x(x-1) + 6(x-1)$$

$$= (x-1)(x^2 - 5x + 6)$$

$$= (x-1)(x^2 - 3x - 2x + 6)$$

$$= (x-1)(x-3)(x-2)$$

QUESTION

Factorize the following

Tah 02

(i) $x^3 - 13x - 12$ [Ans. $(x+1)(x-4)(x+3)$]

(ii) $x^3 - 7x - 6$ [Ans. $(x+2)(x-3)(x+1)$]

(iii) $x^3 - 6x^2 + 11x - 6$ [Ans. $(x-1)(x-2)(x-3)$]

(iv) $2x^3 + 9x^2 + 10x + 3$ [Ans. $(x+1)(x+3)(2x+1)$]

(v) $x^3 - 9x^2 + 23x - 15$ [Ans. $(x-1)(x-3)(x-5)$]

(vi) $2x^3 - 9x^2 + 13x - 6$ [Ans. $(x-1)(x-2)(2x-3)$]

$P(1) = 2 - 9 + 13 - 6 = 0$

$2x^2(x-1) - 7x(x-1) + 6(x-1)$

$(2x^2 - 7x + 6)(x-1)$

$(2x^2 - 4x - 3x + 6)(x-1)$

$(2x-3)(x-2)(x-1)$

(vii) $x^3 - 4x^2 + 5x - 2$ [Ans. $(x-2)(x-1)^2$]

Algebraic Identities

I_1: $(a \pm b)^2 = a^2 + b^2 \pm 2ab$

I_2: $a^2 - b^2 = (a - b)(a + b)$

I_3: $a^3 + b^3 = (a + b)(a^2 - ab + b^2) = (a+b)^3 - 3ab(a+b)$

I_4: $a^3 - b^3 = (a - b)(a^2 + ab + b^2) = (a-b)^3 + 3ab(a-b)$

I_5: $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

I_6: $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

I_7: $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + bc)$

$= a^2 + b^2 + c^2 + 2abc(1/a + 1/b + 1/c)$

I_8: $(a+b+c)^3 = a^3 + b^3 + c^3 + 3(a+b)(b+c)(c+a)$ ⭐⭐⭐⭐⭐⭐⭐⭐⭐⭐⭐⭐⭐⭐

I_9: $a^3 + \mathbf{b^3} + \mathbf{c^3} - \mathbf{3abc} = (\mathbf{a} + \mathbf{b} + \mathbf{c})(\mathbf{a^2} + \mathbf{b^2} + \mathbf{c^2} - \mathbf{ab} - \mathbf{bc} - \mathbf{ca})$ ⭐⭐⭐⭐⭐

$a, b, c \in R$

$$a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$$

S_1: If $a+b+c=0$ then $a^3+b^3+c^3=3abc$ (True / False)

S_2: If $a^3+b^3+c^3=3abc$ then $a+b+c=0$ (True / False)

$$a^3+b^3+c^3=3abc$$

$$a^3+b^3+c^3-3abc=0$$

$$(a+b+c)(a^2+b^2+c^2-ab-bc-ca)=0$$

$$a+b+c=0 \text{ or } a^2+b^2+c^2-ab-bc-ca=0$$

$$\Downarrow$$

$$a=b=c$$

$$a^3+b^3+c^3=3abc \iff a+b+c=0 \text{ or } a=b=c.$$

(ASNC)

$$(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$$

$$(a+b+c+d)^2 = a^2+b^2+c^2+d^2+2(\underbrace{ab+ac+ad+bc+bd+cd}_{\text{sum of products taken two at a time}})$$

$$(a_1+a_2+\cdots+a_n)^2 = a_1^2+a_2^2+a_3^2+\cdots+a_n^2+2(a_1a_2+a_1a_3+\cdots+a_{n-1}a_n)$$

$$(a-b+c)^2 = a^2+b^2+c^2-2ab-2bc+2ca$$

$$(a+b-c)^2 = a^2+b^2+c^2+2ab-2bc-2ca$$

$$(a-b-c)^2 = a^2+b^2+c^2-2ab+2bc-2ca$$

Kya ye sab use hotaa hai JEE mai ...... ???

QUESTION [JEE Mains 2021]

If $a + b + c = 1$, $ab + bc + ca = 2$ and $abc = 3$, then the value of $a^4 + b^4 + c^4$ is equal to

S.B.S

$a^2+b^2+c^2+2(ab+bc+ca)=1$,

$a^2+b^2+c^2+4=1$

$a^2+b^2+c^2=-3$

S.B.S

$\underbrace{a^4+b^4+c^4}+2(a^2b^2+b^2c^2+c^2a^2)=9$

??

$(ab+bc+ca)^2=4$

$a^2b^2+b^2c^2+c^2a^2+2(ab^2c+bc^2a+a^2bc)=4$

$a^2b^2+b^2c^2+c^2a^2+2abc(b+c+a)=4$

$a^2b^2+b^2c^2+c^2a^2+2\cdot3\cdot1=4 \rightarrow a^2b^2+b^2c^2+c^2a^2=-2$

$a^4+b^4+c^4-4=9$

$a^4+b^4+c^4=13$

QUESTION

Tah03

Given that $a + b + c = 3$, $a^2 + b^2 + c^2 = 5$ and $a^3 + b^3 + c^3 = 7$, then the value of $a^4 + b^4 + c^4$ is equal to

QUESTION

If $\sqrt[3]{a} + \sqrt[3]{b} + \sqrt[3]{c} = 0$ then $(a+b+c)^3 =$

$(\sqrt[3]{a})^3 + (\sqrt[3]{b})^3 + (\sqrt[3]{c})^3 = 3\,\sqrt[3]{a}\cdot\sqrt[3]{b}\cdot\sqrt[3]{c}$.

$a+b+c = 3\sqrt[3]{abc}$

CBS

$(a+b+c)^3 = 27abc$.

(A) abc

(B) 3abc — 37%

(C) 9ac

(D) 27abc — 43%

QUESTION

If $\frac{(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3}{(a-b)^3+(b-c)^3+(c-a)^3} = m(a+b)(b+c)(c+a)$, let E

where a, b, c are distinct real numbers then m is equal to.

$a^2-b^2=A$

$b^2-c^2=B$

$c^2-a^2=C$

$0=A+B+C$ — $A^3+B^3+C^3=3ABC$

$a-b=p$

$b-c=q$

$c-a=r$

$0=p+q+r$ — $p^3+q^3+r^3=3pqr$

$$E=\frac{A^3+B^3+C^3}{p^3+q^3+r^3}$$

$$E=\frac{3ABC}{3pqr}=\frac{(a^2-b^2)(b^2-c^2)(c^2-a^2)}{(a-b)(b-c)(c-a)}$$

$$E=(a+b)(b+c)(c+a)$$

$m=1$

QUESTION

$$\sqrt{21-4\sqrt{5}+8\sqrt{3}-4\sqrt{15}} = \sqrt{2^2+(2\sqrt{3})^2+\sqrt{5}^2-2\cdot 2\cdot\sqrt{5}+2\cdot 2\cdot 2\sqrt{3}-2\cdot 2\cdot\sqrt{3}\sqrt{5}}$$

(A) $\sqrt{5}-2+2\sqrt{3}$

$$= \sqrt{(2+2\sqrt{3}-\sqrt{5})^2} = |2+2\sqrt{3}-\sqrt{5}|$$

$$= 2+2\sqrt{3}-\sqrt{5}$$

$$= 2+\sqrt{12}-\sqrt{5}$$

$$= \sqrt{4}+\sqrt{12}-\sqrt{5}.$$

(B) $-\sqrt{5}-\sqrt{4}-\sqrt{12}$

(C) $-\sqrt{5}+\sqrt{4}+\sqrt{12}$

(D) $-\sqrt{5}-\sqrt{4}+\sqrt{12}$

QUESTION

Find the square root of $10+\sqrt{24}+\sqrt{60}+\sqrt{40}$.

Tah04

QUESTION

Jan05

If $a_1 + a_2 + a_3 + a_4 = -3$ and $a_1^2 + a_2^2 + a_3^2 + a_4^2 = 63$ then find value of :

$a_1a_2 + a_2a_3 + a_1a_3 + a_3a_4 + a_1a_4 + a_2a_4 = ?$

(where $a_1, a_2, a_3, a_4 \in R$)

* $a^m \cdot a^n = a^{m+n}$ * $\frac{a^m}{a^n} = a^{m-n}$ * $(a^m)^n = a^{mn}$

* $a^0 = 1 \quad (a \neq 0) \longrightarrow \frac{a^m}{a^m} = 1 \quad (a \neq 0)$

$a^{m-m} = 1$

$a^0 = 1$

* $a^{-m} = \frac{1}{a^m} \quad (a \neq 0)$ $\quad a^m \cdot a^{-m} = a^{m+(-m)} = a^0 = 1$

$a^{-m} = \frac{1}{a^m}.$

* $(a^m b^n)^p = a^{mp} \cdot b^{np}.$

* $a^{m/n} = (a^m)^{1/n} = (a^{1/n})^m.$

* $a^{1/n} = \sqrt[n]{a} \quad n \in N, n \geq 2.$

Laws of Exponents

$0^m = 0$, $m > 0$
0^0 , 0^{-m} is Not def.

Name of Exponent Rules	Rule
Zero Exponent Rule	$a^0 = 1$ (Where $a \neq 0$)
Identity Exponent Rule	$a^1 = a$
Product Rule	$a^m \times a^n = a^{m+n}$
Quotient Rule	$a^m / a^n = a^{m-n}$
Negative Exponents Rule	$a^{-m} = 1/a^m$; $(a/b)^{-m} = (b/a)^m$
Power of a Power Rule	$(a^m)^n = a^{mn}$
Power of a Product Rule	$(ab)^m = a^m b^m$, $(a^p b^q)^\alpha = a^{p\alpha} b^{q\alpha}$
Power of a Quotient Rule	$(a/b)^m = a^m / b^m$
Fractional Rule	$a^{1/n} = \sqrt[n]{a}$; $a^{m/n} = (a^m)^{1/n} = \sqrt[n]{a^m} = \left(a^{1/n}\right)^m = (\sqrt[n]{a})^m$

$$a^x = 1 \begin{cases} x = 0, \; a \neq 0 \\ a = 1, \; x \in R \\ a = -1 \;\&\; a^x = 1 \end{cases}$$

Ex: $(-1)^4 = 1$

$$(-1)^{\frac{4}{3}} = \left((-1)^{\frac{1}{3}}\right)^4 = (-1)^4 = 1.$$

$$a^x = a^y \begin{cases} x = y \\ a = 1 \\ a = -1 \;\&\; (-1)^x = (-1)^y \\ a = 0 \;\&\; x, y > 0. \end{cases}$$

$$(-1)^7 = (-1)^9$$

$$(-1)^{10} = (-1)^2$$

QUESTION

$(1^3 + 2^3 + 3^3 + 4^3)^{-3/2} =$

(A) 10^{-3}

(B) 10^{-2}

(C) 10^{-4}

(D) 10^{-1}

$$\left(\left(\frac{4(4+1)}{2}\right)^2\right)^{-\frac{3}{2}}$$

$$(10^2)^{-\frac{3}{2}}$$

$$= 10^{-3}$$

★ $\sum_{r=1}^{n} r = 1+2+3+\text{—}+n = \frac{n(n+1)}{2}$

★ $\sum_{r=1}^{n} r^2 = 1^2+2^2+\text{—}+n^2 = \frac{n(n+1)(2n+1)}{6}$

★ $\sum_{r=1}^{n} r^3 = 1^3+2^3+\text{—}+n^3 = \left(\frac{n(n+1)}{2}\right)^2$

★ $\sum_{r=1}^{n} (2r-1) = 1+3+5+7+\text{—}+(2n-1) = n^2$

★ $\sum_{r=1}^{n} (2r) = 2+4+6+\text{—}+2n = n(n+1)$

QUESTION

Tah06

If $\sqrt[4]{\sqrt[3]{x^2}} = x^k$, then k =

(A) $\frac{2}{6}$

(B) 6

(C) $\frac{1}{6}$

(D) 7

QUESTION

Jan 07

The numerical value of $\left(x^{1/a-b}\right)^{1/a-c} \times \left(x^{1/b-c}\right)^{1/b-a} \times \left(x^{1/c-a}\right)^{1/c-b}$ is (a, b, c are distinct real numbers)

(A) 1

(B) 8

(C) 0

(D) None

QUESTION

$$\sqrt{6+\sqrt{6+\sqrt{6+\sqrt{6+\cdots\infty \text{ times}}}}} = \quad x$$

$\sqrt{6+x} = x$

$x^2 = x+6$

$x^2-x-6=0$

$x = 3, \cancel{-2}$

(A) 3

(B) 2

(C) 1

(D) ± 3

QUESTION

$\sqrt{5+\sqrt{5+\sqrt{5}}+\cdots\infty}$ is equal to

Tah08

(A) 5

(B) $5+\sqrt{5}$

(C) $\frac{1+\sqrt{21}}{2}$

(D) $\frac{\sqrt{5}-1}{2}$

QUESTION

Tah09

If $a, b, c \in R$ and $a, b, c \neq 0$ such that $\frac{a}{b}+\frac{b}{c}+\frac{c}{a}=6$ and $\frac{b}{a}+\frac{c}{b}+\frac{a}{c}=8$, then $\frac{a^3}{b^3}+\frac{b^3}{c^3}+\frac{c^3}{a^3}-3$ is equal to

(A) 81

(B) 48

(C) 72

(D) 84

QUESTION

Tan 10

Let $a, b, c \in N (a > b)$ satisfy $c^2 - a^2 - b^2 = 101$ with $ab = 72$. Then which of the following can be correct?

(A) b and c are coprime

(B) c is an odd prime

(C) $(a + b + c)$ is even

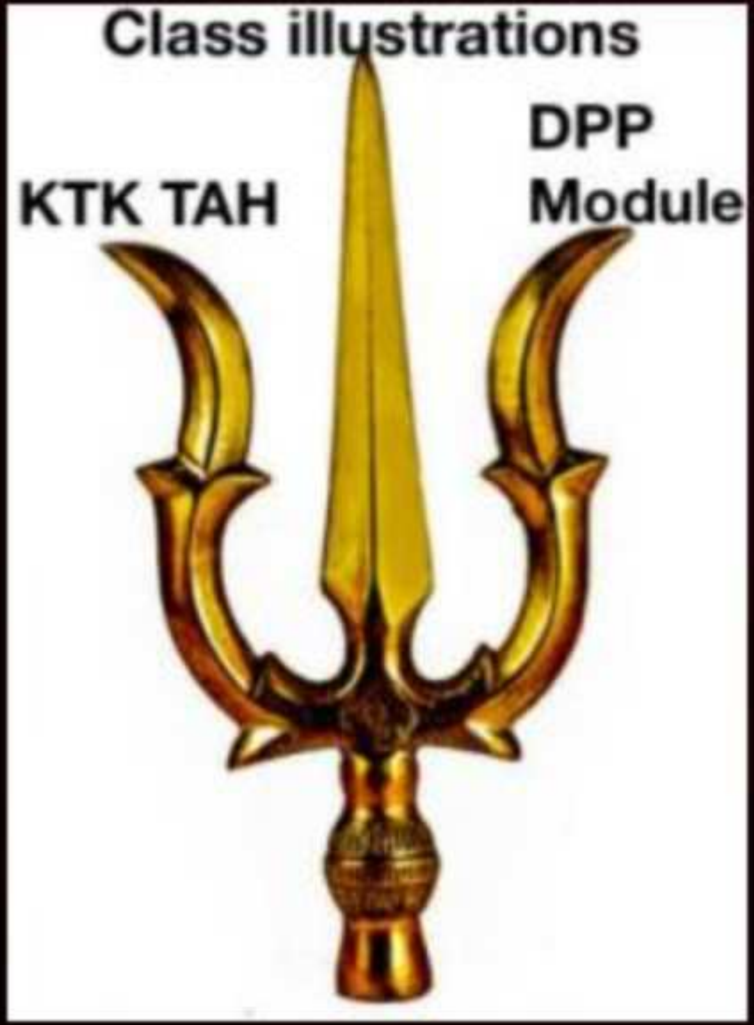
(D) $a + b = c + 1$

Ans. A, D

Saari Class Illustrations
Retry karni Hai

Today's KTK

No Selection $\xrightarrow[\text{Apnao IIT Jao}]{\text{TRISHUL}}$ Selection with Good Rank



QUESTION

(KTK 1)

If a, b, & c are three non zero real numbers such that $5a^2 + 4b^2 + 4c^2 - 8ab - 4ac = 0$ then the value of $a/b + b/c$ is ______

Ans. 3

QUESTION

(KTK 2)

If a, b, & c are three non zero real numbers such that $2a^2 + b^2 + c^2 - 2ab - 2ac = 0$ then the value of $\frac{a+b}{c}$ is equal to ______

Ans. 2

QUESTION

(KTK 3)

If $x^2 + 16y^2 + 9z^2 = 4xy + 12yz + 3zx$ then find the value of $\frac{x+4y}{3z}$. (Given $x, y, z \in R_0$)

Ans. 2

QUESTION

(KTK 4)

If the real numbers x, y, z are such that
$x^2 + 4y^2 + 16z^2 = 48$ and $xy + 4yz + 2zx = 24$,
what is the value of $x^2 + y^2 + z^2$?

Ans. 21

QUESTION

(KTK 5)

If x, y, z are real numbers then find the minimum value of
$4x^2 + y^2 + 9z^2 - 4x - 2y - 6z + 17$.

Solution to Previous TAH

QUESTION

If $81x^5 + 27x^3 - 9x^2 + 50$ is divided by $(3x + 2)$ then remainder is λ then

(A) $\frac{3\lambda-42}{10}$ is equal to 4

(B) if $\lambda = \frac{p}{q}$ then $(p + q)$ is divisible by 17 (where p & q are coprime)

(C) λ is a natural number

(D) $\left(\lambda - \frac{1}{3}\right)$ is divisible by 3

Ans. A, B, D

(36) If $81x^5+27x^3-9x^2+50$ is divided by $(3x+2)$ then remainder is λ then-

$P(x) = 81x^5+27x^3-9x^2+50$

$\therefore P(-2/3) = \lambda$

$\Rightarrow 81\times\left(-\frac{2}{3}\right)^5+27\left(-\frac{2}{3}\right)^3-9\left(-\frac{2}{3}\right)^2+50 = \lambda$

$\Rightarrow -\frac{32}{3}-8-4+50 = \lambda$

$\Rightarrow 50-\frac{32}{3}-12 = \lambda$

$\Rightarrow \frac{150-32-36}{3} = \lambda$

$\Rightarrow \lambda = \frac{150-68}{3} = \frac{82}{3}$

$\frac{3\lambda-42}{10} = \frac{82-42}{10} = \frac{40}{10} = 4$.

$82+3 = 85 = 5\times17$.

$\frac{82}{3}-\frac{1}{3} = \frac{81}{3} = 27 = 3\times9$

$\therefore$ Ans $\rightarrow$ (a), (b), (d)

QUESTION

Let $f(x) = x^{135} + x^{125} - x^{115} + x^5 + 1$. If $f(x)$ is divided by $x^3 - x$ then the remainder is some function of x say $g(x)$. Find the value of $g(10)$.

Ans. 21

(37) Let $f(x) = x^{135} + x^{125} - x^{115} + x^{5} + 1$. If $f(x)$ is divided by $x^3 - x$ then the remainder is some f^n of x say $g(x)$. $g(10) = ?$

$f(x) = x^{135} + x^{125} - x^{115} + x^{5} + 1$

$(x^3 - x) = x(x+1)(x-1)$

$\therefore f(0) = 0 + 0 - 0 + 0 + 1 = 1$

$f(-1) = -1 - 1 + 1 - 1 + 1 = (-1)$

$f(1) = 1 + 1 - 1 + 1 + 1 = 3$

$f(x) = (x^3 - x)\, Q(x) + g(x)$

Let $g(x) = ax^2 + bx + c$.

$f(x) = (x^3 - x)\, Q(x) + (ax^2 + bx + c)$

$f(1) = a + b + c = 3$

$f(0) = c = 1$

$f(-1) = a - b + c = (-1)$

$\therefore c = 1,\ a + b + c = 3 \Rightarrow a + b = 2 \ \Big|\ a - b + c = (-1) \Rightarrow a - b = (-2)$

$\therefore 2a = 0,\ a = 0 \ \Big|\ b = 2$

$\therefore g(x) = ax^2 + bx + c$

$= 0 + 2x + 1$

$= 2x + 1$

$g(10) = 20 + 1 = 21$

(Ans)

QUESTION

If $p(x)$ is a polynomial of 3 degree for which $p(1) = 1$, $p(2) = 4$, $p(3) = 9$ then find the value of $p(5)$ and leading coefficient be 2.

Ans. 73

(38) If $p(x)$ is a polynomial of 3 degree for which $p(1)=1$, $p(2)=4$, $p(3)=9$ then find the value of $p(5)$ and leading coefficient be 2.

$g(x) = p(x) - x^2$.

$g(1) = p(1) - 1 = 1 - 1 = 0$

$g(2) = p(2) - 4 = 4 - 4 = 0$

$g(3) = p(3) - 9 = 9 - 9 = 0$

$g(x)$ ~~roots~~ factors $= (x-1), (x-2), (x-3)$

$g(x) = a(x-1)(x-2)(x-3)$

$\Rightarrow p(x) - x^2 = a(x-1)(x-2)(x-3)$

$\Rightarrow p(x) = 2(x-1)(x-2)(x-3) + x^2$.

$p(5) = 2 \times 4 \times 3 \times 2 + 25$

$= 48 + 25$

$= 73$.

$\therefore p(5) = 73$ (Ans)

Mann Ki Baat Ashish Sir ke Saath

SHORT NOTES

- Class Notes Bananaa → MY HAND WRITTEN NOTES

  Rough copy + Notes copy

  Theoretical points.

- Question Liknaa → Blank PPT

Tum Bs Question Practice Karo

THANK YOU