

10. If $a+b+c=0$, then $\frac{1}{a^2+b^2-c^2} + \frac{1}{b^2+c^2-a^2} + \frac{1}{c^2+a^2-b^2} = ?$

यदि $a+b+c=0$ है, तो $\frac{1}{a^2+b^2-c^2} + \frac{1}{b^2+c^2-a^2} + \frac{1}{c^2+a^2-b^2} = ?$

[A] $\frac{1}{a^2+b^2+c^2}$

[B] 1

[C] -1

[D] 0

$$\frac{1}{-2} + \frac{1}{4} + \frac{1}{4} = 0$$

11. If $a+b+c=0$, then the value of $\frac{2a^2}{(b^2+c^2-a^2)} + \frac{2b^2}{(a^2+c^2-b^2)} + \frac{2c^2}{(a^2+b^2-c^2)}$ is equal to:

यदि $a+b+c=0$ है, तो $\frac{2a^2}{(b^2+c^2-a^2)} + \frac{2b^2}{(a^2+c^2-b^2)} + \frac{2c^2}{(a^2+b^2-c^2)}$ का मान किसके बराबर है?

[A] 3

[B] -3

[C] -4

[D] 0

$$\frac{-2}{4} + \frac{-2}{4} + \frac{8}{-2}$$

$$-1-4$$
$$=-3$$



12. If $xy+yz+zx=0$, then $\left(\frac{1}{x^2-yz} + \frac{1}{y^2-zx} + \frac{1}{z^2-xy}\right) = ?$ ($x, y, z \neq 0$)

यदि $xy+yz+zx=0$ हो, तो $\left(\frac{1}{x^2-yz} + \frac{1}{y^2-zx} + \frac{1}{z^2-xy}\right) = ?$ ($x, y, z \neq 0$)

[A] 3

[B] 1

[C] $x+y+z$

[D] 0 ✓

put $\{x=y=1 \text{ तो } z=-\frac{1}{2}\}$

$$1+Z+Z=0$$

$$2Z=-1$$

$$Z=-\frac{1}{2}$$

$$x=2$$

$$y=2$$

$$Z=-1$$

$$\frac{1}{6} + \frac{1}{6} - \frac{1}{3} = 0$$

13. If $pq+qr+rp=0$, then $\left(\frac{p^2}{p^2-qr} + \frac{q^2}{q^2-rp} + \frac{r^2}{r^2-pq}\right) = ?$

यदि $pq+qr+rp=0$ हो, तो $\left(\frac{p^2}{p^2-qr} + \frac{q^2}{q^2-rp} + \frac{r^2}{r^2-pq}\right) = ?$

[A] 3

[C] 2

[B] 1

[D] 0

$$p=2$$

$$q=2$$

$$r=-1$$

$$\frac{4}{6} + \frac{4}{6} + \frac{1}{-3}$$

$$\frac{4}{3} - \frac{1}{3} = 1$$



14. If $abc=1$, then find the value of $\frac{123}{1+a+ab} + \frac{123}{1+b+bc} + \frac{123}{1+c+ca}$?
 यदि $abc=1$ है, तो $\frac{123}{1+a+ab} + \frac{123}{1+b+bc} + \frac{123}{1+c+ca}$ का मान ज्ञात कीजिये?

[A] ~~3~~

[B] 41

[C] 123 ✓

[D] 369

$$= \cancel{3} \times \frac{123}{\cancel{3}}$$

15. If $a+b+c=2s$, then $\frac{(s-a)^2 + (s-b)^2 + (s-c)^2 + s^2}{a^2 + b^2 + c^2} = ?$

यदि $a+b+c=2s$ है, तो $\frac{(\cancel{s}-a)^2 + (\cancel{s}-b)^2 + (\cancel{s}-c)^2 + \cancel{s}^2}{a^2 + b^2 + c^2} = ?$

[A] $a^2 + b^2 + c^2$

[B] 0

[C] 1 ✓ *pret $s=0$*

[D] 2

+3-चर $\rightarrow a, b, c, s$
1 eqⁿ

15. If $a+b+c=2s$, then $\frac{(s-a)^2 + (s-b)^2 + (s-c)^2 + s^2}{a^2 + b^2 + c^2} = ?$

यदि $a+b+c=2s$ है, तो $\frac{(s-a)^2 + (s-b)^2 + (s-c)^2 + s^2}{a^2 + b^2 + c^2} = ?$

[A] $a^2 + b^2 + c^2$

[B] 0

[C] 1

[D] 2

+3-चर $\rightarrow a, b, c, s$
समतो $\rightarrow$ $1 \log^n$

$$\frac{1+1+1+9}{4+4+4} = 1$$

16. If $2s = a+b+c$, then what is the value of $s^2 + (s-a)(s-b) + (s-b)(s-c) + (s-c)(s-a)$?
यदि $2s = a+b+c$, तो $s^2 + (s-a)(s-b) + (s-b)(s-c) + (s-c)(s-a)$ का मान क्या है?

(CDS 2023)

[A] $(a+b+c)^2$

[C] $2(ab+bc+ca)$

[B] $ab+bc+ca$

[D] $3(ab+bc+ca)$

$ab+bc+ca$ ✓

put $s=0$

$a+b+c=0$

17. If $2s=a+b+c$, then what is $s(s-a)(s-b)(s-c) \left[\frac{1}{s-a} + \frac{1}{s-b} + \frac{1}{s-c} - \frac{1}{s} \right]$ equal to?

यदि $2s=a+b+c$, तो $s(s-a)(s-b)(s-c) \left[\frac{1}{s-a} + \frac{1}{s-b} + \frac{1}{s-c} - \frac{1}{s} \right]$ किसके बराबर है?

(UPSC CDS-1 2025)

[A] $abc=8$

[C] $4abc$

[B] $2abc$

[D] $ab+bc+ca$

put $a=b=c=2$
 $8=8$

$3 \times 1 \times \left[1+1+1-\frac{1}{3} \right]$
 $9-1$
 $=8$



18. What is $\frac{x^2 - y^2 - z^2 - 2yz}{x^2 + y^2 - z^2 + 2xy} + \frac{x^2 - y^2 - z^2 - 2yz}{x^2 - y^2 + z^2 - 2xz}$ equal to?

$\frac{x^2 - y^2 - z^2 - 2yz}{x^2 + y^2 - z^2 + 2xy} + \frac{x^2 - y^2 - z^2 - 2yz}{x^2 - y^2 + z^2 - 2xz}$ किसके बराबर है?

(CDS 2023)

[A] $\frac{x}{x+y-z}$

[C] $\frac{2x}{x+y-z}$

[B] $\frac{y+z}{x+y-z}$

[D] $\frac{2y+2z}{x+y-z}$

put $z=0$

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

19. If $p = \frac{a^2}{(b-a)(c-a)}$, $q = \frac{b^2}{(c-b)(a-b)}$, $r = \frac{c^2}{(a-c)(b-c)}$, then find $(p + q + r)^2$?

यदि $p = \frac{a^2}{(b-a)(c-a)}$, $q = \frac{b^2}{(c-b)(a-b)}$, $r = \frac{c^2}{(a-c)(b-c)}$, तो $(p + q + r)^2$ ज्ञात करें?

(CDS 2023)

[A] 9 $p = \frac{1}{1 \times 2} = \frac{1}{2}$

[B] 4

[C] 1 $q = \frac{4}{1 \times -1} = -4$

[D] 0

$$\left(\frac{1}{2} - 4 + \frac{9}{2}\right)^2 = 1$$

put $a=1$
 $b=2$
 $c=3$

$$r = \frac{9}{-2 \times -1} = \frac{9}{2}$$

20. What is the value of $\frac{a^2+ac}{a^2c-c^3} - \frac{a^2-c^2}{a^2c+2ac^2+c^3} - \frac{2c}{a^2-c^2} + \frac{3}{a+c}$?

$\frac{0}{-c^3} - \frac{a^2-c^2}{a^2c+2ac^2+c^3} - \frac{2c}{a^2-c^2} + \frac{3}{a+c}$ का मान क्या है?

[A] 0

[B] 1

[C] $\frac{ac}{a^2+c^2}$

[D] $\frac{6}{a+c}$

put $a=0$

$$0 + \frac{1}{c} + \frac{2}{c} + \frac{3}{c} = \frac{6}{c}$$

21. What is $\frac{x^4}{(x^2-y^2)(x^2-z^2)} + \frac{y^4}{(y^2-x^2)(y^2-z^2)} + \frac{z^4}{(z^2-x^2)(z^2-y^2)}$ equal to?

$\frac{x^4}{(x^2-y^2)(x^2-z^2)} + \frac{y^4}{(y^2-x^2)(y^2-z^2)} + \frac{z^4}{(z^2-x^2)(z^2-y^2)}$ किसके बराबर है?

[A] 0

[B] 1

[C] -1

[D] $x^2 + y^2 + z^2$

put $z=0$

$$\frac{x^4}{x^2-y^2} - \frac{y^4}{x^2-y^2} = 1$$

22. What is $\frac{1}{x(x-y)(x-z)} + \frac{1}{y(y-z)(y-x)} + \frac{1}{z(z-x)(z-y)}$ equal to?

$\frac{1}{x(x-y)(x-z)} + \frac{1}{y(y-z)(y-x)} + \frac{1}{z(z-x)(z-y)}$ किसके बराबर है?

[A] ~~0~~

[B] ~~1~~

☒ [C] $1/xyz = \frac{1}{6}$

[D] ~~$-1/xyz$~~

put $x=1$

$y=2$

$z=3$

$$\frac{1}{-1 \times -2} + \frac{1}{2 \times -1 \times 1} + \frac{1}{3 \times 2 \times 1}$$

$$= \frac{1}{2} - \frac{1}{2} + \frac{1}{6}$$
$$= \frac{1}{6}$$

23. The value of $\frac{a^2 - (b - c)^2}{(a + c)^2 - b^2} + \frac{b^2 - (a - c)^2}{(a + b)^2 - c^2} + \frac{c^2 - (a - b)^2}{(b + c)^2 - a^2}$ is:

$\frac{a^2 - (b - c)^2}{(a + c)^2 - b^2} + \frac{b^2 - (a - c)^2}{(a + b)^2 - c^2} + \frac{c^2 - (a - b)^2}{(b + c)^2 - a^2}$ का मान क्या होगा?

(SSC CPO 2023)

[A] 3

[C] 1

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

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

[B] -1

[D] 2

put $c = 0$

$$1 + \frac{b - 0}{b + 0} + \frac{0 - b}{b + 0}$$

24. $(x + y + z)^3 - (x + y - z)^3 - (y + z - x)^3 - (z + x - y)^3 = ?$

[A] ~~$8(x+y+z)$~~

[B] ~~$24xyz = 24 \times 6$~~

[C] ~~$12xyz$~~

[D] ~~24~~

put $x=1$

$y=2$

$z=3$

$216 - 0 - 64 - 8$

$= 144$

25. The expression $\frac{[(x^3-1)(x^2-9x+14)]}{[(x^2+x+1)(x^2-8x+7)]}$ simplifies to:

$\frac{[(x^3-1)(x^2-9x+14)]}{[(x^2+x+1)(x^2-8x+7)]}$ को सरल करो।

[A] $(x-1)$

[C] $(x-7)$

[B] $(x-2)$

[D] $(x+2)$

put $x=0$

$\rightarrow \frac{-14}{7} = -2$

26. If $P = \frac{x^4 - 8x}{x^3 - x^2 - 2x}$, $Q = \frac{x^2 + 2x + 1}{x^2 - 4x - 5}$ and $R = \frac{2x^2 + 4x + 8}{x - 5}$, then $(P \times Q) \div R$ is equal to:

यदि $P = \frac{x^4 - 8x}{x^3 - x^2 - 2x}$, $Q = \frac{x^2 + 2x + 1}{x^2 - 4x - 5}$ and $R = \frac{2x^2 + 4x + 8}{x - 5}$ है, तो $(P \times Q) \div R$ किसके बराबर है ?

[A] $\frac{1}{2}$ $P = \frac{x \cdot (x^3 - 8)}{x \cdot (x^2 - 2x - 5)}$

[B] 1

[C] 2

[D] 4

$$\left(\frac{-4}{5}\right) \div \left(\frac{-8}{5}\right) = \frac{1}{2}$$

put $x=0$

$$P = 4$$

$$Q = -\frac{1}{5}$$

$$R = -\frac{8}{5}$$

27. If $p = \sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^2 + b^3}}$, then what is $p^3 + 3bp$ equal to?

यदि $p = \sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^2 + b^3}}$, तो $p^3 + 3bp$ किसके बराबर है?

(CDS-1 2024)

$$[A] - 2a$$

[B] a

[c] 2a

[D] 3a

$$= 2a$$

$\rightarrow b, a, b$

but $b=0$

$$(V.V.V.Vimp)$$

$$b = \sqrt[3]{2a}$$

28. If $a + b + c = 1$ and $a^3 + b^3 + c^3 = 4$, then $\frac{1}{a+bc} + \frac{1}{b+ac} + \frac{1}{c+ab} = ?$
 यदि $a + b + c = 1$ और $a^3 + b^3 + c^3 = 4$ है, तो $\frac{1}{a+bc} + \frac{1}{b+ac} + \frac{1}{c+ab} = ?$

[A] 1

[B] -1

[C] -2

[D] 3

$$= \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$$

2 eqⁿ
 हर को a, b, c

$$\text{put } c = 0$$

$$a + b = 1$$

$$a^3 + b^3 = 4$$

$$= \frac{(b+a)+1}{ab}$$

$$= \frac{2}{ab} = -2$$

$$\Rightarrow 4 = 1 \times (1^3 - 3ab)$$

$$3 = -3ab \Rightarrow -1 = ab$$

29. If $\frac{a}{b+c} + \frac{b}{c+a} + \frac{c}{a+b} = 1$, then find $\frac{a^2}{b+c} + \frac{b^2}{c+a} + \frac{c^2}{a+b} = ?$

यदि $\frac{a}{b+c} + \frac{b}{c+a} + \frac{c}{a+b} = 1$ है, तो $\frac{a^2}{b+c} + \frac{b^2}{c+a} + \frac{c^2}{a+b}$ ज्ञात कीजिए।

[A] 0

[C] 3

[B] -2

[D] 1

$$= \frac{a^2}{b} + \frac{b^2}{a}$$

$$= \frac{a^3 + b^3}{ab} = 0$$

1 eqⁿ
a, b, c

put c=0

$$\left(\frac{a}{b}\right) + \left(\frac{b}{a}\right) = 1$$

$$\Rightarrow \left(\frac{a}{b}\right)^3 = -1 \Rightarrow a^3 = -b^3$$

30. If $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 0$, then $\frac{ac}{b^2} + \frac{b^2}{ac} - \frac{c^3}{a^3} = ?$

यदि $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 0$ है, तो $\frac{ac}{b^2} + \frac{b^2}{ac} - \frac{c^3}{a^3} = ?$

[A] -3

[B] -2

[C] -1

[D] 0

but $b=c=1$

त्रिकर $1 \log^n$
अतः a, b, c

$$a + 1 + \frac{1}{a} = 0$$

$$a + \frac{1}{a} = -1$$

$$\Rightarrow a^3 = 1$$

$$= a + \frac{1}{a} - \frac{1}{a^3}$$

$$= -1 - 1$$

$$= -2$$

30. If $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 0$, then $\frac{ac}{b^2} + \frac{b^2}{ac} - \frac{c^3}{a^3} = ?$

यदि $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 0$ है, तो $\frac{ac}{b^2} + \frac{b^2}{ac} - \frac{c^3}{a^3} = ?$

[A] -3

[B] -2

[C] -1

[D] 0

but $a=c=1$

त्रिकोण $\frac{1}{b^2} + b^2 - 1$
लेता a, b, c

$$\frac{1}{b} + b = -1$$

$$b + \frac{1}{b} = -1$$

$$\begin{aligned} & \frac{1}{b^2} + b^2 - 1 \\ &= \cancel{(-1)^2} - 2 - 1 \\ &= -2 \end{aligned}$$

31. If $\left[\sqrt{a^2 + b^2 + ab}\right] + \left[\sqrt{a^2 + b^2 - ab}\right] = 1$, then what is the value of $(1-a^2)(1-b^2)$?

यदि $\left[\sqrt{a^2 + b^2 + ab}\right] + \left[\sqrt{a^2 + b^2 - ab}\right] = 1$ है, तो $(1-a^2)(1-b^2)$ का मान क्या है?

$$= 1 - \frac{1}{4} = \frac{3}{4}$$

[A] $1/4$

[B] $4/7$

[C] $5/4$

[D] $3/4$

(SSC GIL MAINS 2017)

$$\text{put } b=0$$

$\rightarrow a, b$

$$a+a=1$$

$$\Rightarrow a = \frac{1}{2}$$



32. If $\frac{a-b}{c} + \frac{b+c}{a} + \frac{c-a}{b} = 1$ and $(b+c \neq a)$, then find the value of $\frac{ab+bc+ca}{ab}$.

यदि $\frac{a-b}{c} + \frac{b+c}{a} + \frac{c-a}{b} = 1$ और $(b+c \neq a)$ है, तो $\frac{ab+bc+ca}{ab}$ का मान ज्ञात कीजिए।

[A] 0

[B] 1

[C] 2

[D] 3

$$1 + \frac{1}{2} + \frac{1}{2} = 2$$

put $a=b=1$

$$1+c+c-1=1$$

$$2c=1$$

$$c=\frac{1}{2}$$

33. If $\left(x + \frac{1}{yz}\right) - \left(y + \frac{1}{zx}\right) = \left(y + \frac{1}{zx}\right) - \left(z + \frac{1}{xy}\right)$ & $x + z \neq 2y$, then what is xyz equal to?

यदि $\left(x + \frac{1}{yz}\right) - \left(y + \frac{1}{zx}\right) = \left(y + \frac{1}{zx}\right) - \left(z + \frac{1}{xy}\right)$ & $x + z \neq 2y$, तो xyz किसके बराबर है?

(UPSC CDS-2 2024)

[A] -3

[B] -1

[C] 1

[D] 2

$$x + z - 2y \neq 0$$

$$x - 2y + z = -\frac{1}{yz} + \frac{2}{zx} - \frac{1}{xy}$$

$$x - 2y + z = \frac{-x + 2y - z}{xyz}$$

$$\cancel{x - 2y + z} = -\frac{\cancel{(x - 2y + z)}}{xyz}$$
$$xyz = -1$$

34. If $x = \left(\frac{a}{b}\right) + \left(\frac{b}{a}\right)$, $y = \left(\frac{b}{c}\right) + \left(\frac{c}{b}\right)$ and $z = \left(\frac{c}{a}\right) + \left(\frac{a}{c}\right)$, then what is the value of $xyz - x^2 - y^2 - z^2$?

यदि $x = \left(\frac{a}{b}\right) + \left(\frac{b}{a}\right)$, $y = \left(\frac{b}{c}\right) + \left(\frac{c}{b}\right)$ तथा $z = \left(\frac{c}{a}\right) + \left(\frac{a}{c}\right)$ है, तो $xyz - x^2 - y^2 - z^2$ का मान क्या है?

[A] -4

[B] 2

[C] -1

[D] -6

$$\begin{aligned} & 8 - 4 - 4 - 4 \\ & = -4 \end{aligned}$$

put $a=b=c=1$

$$x=y=z=2$$

35. If $y = \frac{2-x}{1+x}$, then $\frac{1}{y+1} + \frac{2y+1}{y^2-1} = ?$

यदि $y = \frac{2-x}{1+x}$ है, तो $\frac{1}{y+1} + \frac{2y+1}{y^2-1} = ?$

[A] $\frac{(1+x)(2-x)}{2x-1}$

[B] $\frac{(1-x)(2+x)}{x-1}$

[C] $\frac{(1+x)(2-x)}{1-2x} = 2$

[D] $\frac{(1+x)(1-2x)}{2-x}$

put $x=0$

$y=2$

$\frac{1}{3} + \frac{5}{3} = 2$

36. If $p = \frac{\sqrt{3q+2} + \sqrt{3q-2}}{\sqrt{3q+2} - \sqrt{3q-2}}$ then what is the value of $p^2 - 3pq + 2$?

यदि $p = \frac{\sqrt{3q+2} + \sqrt{3q-2}}{\sqrt{3q+2} - \sqrt{3q-2}}$ है, तो $p^2 - 3pq + 2$ का मान क्या होगा?

[A] 0

[C] 2

[B] 1

[D] 3

let $q=2$
 $\rightarrow p=2$

$$p = \frac{\sqrt{2+2} + \sqrt{2-2}}{\sqrt{2+2} - \sqrt{2-2}}$$

$$p = \frac{\sqrt{2} + 1}{\sqrt{2} - 1} = 3 + 2\sqrt{2}$$

$$9 + 8 + 12\sqrt{2} - 6(3 + 2\sqrt{2}) + 2 = 1$$