$\Rightarrow x = 1$ satisfies

so, $8(1)^{10} + \frac{4}{(1)^5} = 8 + 4 = 12$

58. (D) Given :
Shortcut
given $a+b+c = 6$
& $a^2+b^2+c^2 = 14$
so, $a = 1 \quad b = 2$ and $c = 3$
satisfies the given equation.
so, $ab+bc+ca = 1\times2+2\times3+3\times1$
$= 2+6+3 = 11$

59. (D) Given :
$3x^2 - 4x - 3 = 0$
$\Rightarrow$ divide by x both the sides

$\Rightarrow 3x - 4 - \frac{3}{x} = 0$

$\Rightarrow 3\left(x - \frac{1}{x}\right) = 4$

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

60. (C) Given :
$x = 11$
(given)
$x^5 - 12x^4 + 12x^3 - 12x^2 + 12x - 1$
$= (11)^5 - 11(11)^4 - (11)^4 + 11(11)^3 + (11)^3 - 11(11)^2 - (11)^2 + 11(11) + 11 - 1$
$= (11)^5 - (11)^5 - (11)^4 + (11)^4 + (11)^3 - (11)^3 - (11)^2 + (11)^2 + 10$
$= 10$

61. (A) $8x^3 + 12x^2 + 6x + 1$
$= (2x)^3 + 3 \times (2x)^2 \times 1 + 3 \times (1)^2 \times 2x + (1)^2$
$= (2x + 1)^3$
[using $a^3 + 3a^2b + 3ab^2 + b^2 = (a+b)^3$]

62. (B) Let compute P(–2) value of p(y) when y is replaced by –2, we have,
$p(-2) = (-2)^3 + (-2)^2 + 2 \times (-2) + 3$
$= -8 + 4 - 4 + 3 = -5$
Thus $(p(-2)) = -5$ is the remainder when p(y) is divided by $(y + 2)$.

63. (B) Let $p(x) = 3x^2 + kx + 6$ be the given polynomial. Then, $(x + 3)$ is a factor of p(x)
$\Rightarrow \quad p(-3) \Rightarrow 3(-3)^2 + k(-3) + 6 = 0$
$\Rightarrow \quad 33 - 3k = 0$
$k = 11$

64. (D) Let $p(x) = 2x^3 + ax^2 + 11x + a + 3$
If (P(x)) is exactly divisible by $(2x - 1)$, then $(2x - 1)$ is a factor of P(x).
$\therefore$

$P\left(\frac{1}{2}\right) = 0 \quad \left[\because 2x - 1 = 0 \Rightarrow x = \frac{1}{2}\right]$

$\Rightarrow \quad 2 \times \left(\frac{1}{2}\right)^3 + a \times \left(\frac{1}{2}\right)^2 + 11 \times \frac{1}{2} + a + 3 = 0$

$\Rightarrow \quad \frac{1}{4} + \frac{a}{4} + \frac{11}{2} + a + 3 = 0$

$\Rightarrow \quad \frac{1 + a + 22 + 4a + 12}{4} = 0$

$\Rightarrow \quad \frac{5a + 35}{4} = 0$

$\Rightarrow \quad 5a = -35 \qquad \Rightarrow a = -7$

65. (B) Let $(p(x)) = x^3 - ax^2 - 13x + b$
If $(x - 1)$ and $(x + 3)$ are factors of p(x), then
$p(1) = 0$ and $p(-3) = 0$
$\Rightarrow \quad 1^3 - a \times 1^2 - 13 \times 1 + b = 0$ and $(-3)^3 - a(-3)^2 - 13 \times -3 + b = 0$
$\Rightarrow 1 - a - 13 + b = 0$ and $-27 - 9a + 39 + b = 0$
$\Rightarrow a - b = -12 \ldots$(I) and $9a - b = 12 \ldots$(II)
Subtracting the equation from first, we get
$\Rightarrow \quad (a - b) - (9a - b) = -12 - 12$
$\Rightarrow \quad -8a = -24 \qquad \Rightarrow a = 3$
Putting $a = 3$ in $(a - b) = -12$, we get
$3 - b = -12 \qquad \Rightarrow b = 15$

66. (B) $f(x) = x^4 + 2x^3 - 2x^2 + 2x - 3$
factorize f(x) we get
$(x^2 + 2x - 3)(x^2 + 1)$
So, f(x) is exactly divisible by $x^2 + 2x - 3$.

67. (C) Let $f(x) = px^2 + 5x + r$

Since $(x - 2)$ and $\left(x - \frac{1}{2}\right)$ are factors of f(x) therefore, $f(2) = 0$ and $f\left(\frac{1}{2}\right) = 0$

$\left[\because x - 2 = 0 \Rightarrow x = 2 \text{ and } x - \frac{1}{2} = 0 \Rightarrow x = \frac{1}{2}\right]$

$\Rightarrow P \times 2^2 + 5 \times 2 + r = 0$

and $P\left(\frac{1}{2}\right)^2 + 5 \times \frac{1}{2} + r = 0$

$\Rightarrow 4P + 10 + r = 0$ and $\frac{P}{4} + \frac{5}{2} + r = 0$

$\Rightarrow 4P + r = -10$ and $\frac{P + 4r + 10}{4} = 0$

$\Rightarrow 4P + r = -10$ and $P + 4r + 10 = 0$

$\Rightarrow 4P + r = -10$ ...(I)

and $P + 4r = -10$ ...(II)

from (I) and (II)

$4P + r = P + 4r$

$\Rightarrow 3P = 3r$

$\Rightarrow p = r$

$\Rightarrow \frac{P}{r} = 1$

68. (C) Let $f(x) = 30(x^2 - 3x + 2)$
$g(x) = 50(x^2 - 2x + 1)$
writing f(x) and g(x) as a product of powers of irreducible factors.
$f(x) = 2 \times 3 \times 5 \times (x - 1) \times (x - 2)$
$g(x) = 2 \times 5^2 \times (x - 1)$
$HCF = 10(x - 1)$

69. (A) Given:
$f(x) = 2 \times 5 \times (x + 1)(x - 3)^3$
$g(x) = 3 \times 5 \times (x - 2)(x - 3)^2$
$h(x) = 5^2 \times (x + 5) \times (x - 3)^3$
Hence $HCF = 5(x - 3)^2$

70. (C) Writing the polynomials as a product of powers of irreducible factors, we get
$f(x) = 2^2 \times (x - 1)^2 \times (x + 2) \times (x + 4)$
$g(x) = 2 \times 5 \times (x - 1) \times (x + 2) \times (x + 5)$
$(x + 2)$
or $g(x) = 2 \times 5 \times (x - 1) \times (x + 2)^2 \times (x + 5)$
$LCM = 20(x - 1)^2 (x + 2)^2 (x + 4)(x + 5)$

71. (A) Let $a = 30$, $b = 20$ and $c = -50$ then,
$a + b + c = 30 + 20 - 50 = 0$
$\therefore a^3 + b^3 + c^3 = 3abc$
$\Rightarrow 30^3 + 20^3 + (-50)^3 = 3 \times 30 \times 20 \times (-50) = -90000.$

72. (D) Squaring both the sides:

$\left(\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}}\right)^2 = \left(\frac{10}{3}\right)^2$

$\Rightarrow \left(\frac{x + y}{\sqrt{xy}}\right)^2 = \left(\frac{10}{3}\right)^2$

$\Rightarrow (x + y)^2 = \frac{100}{9}xy$

So, $xy = 9$ because $x + y = 10$ given.

73. (A) α and β are the roots of the equation
$x^2 - qx - (q + r) = 0$
$\therefore \alpha + \beta = q$ and $\alpha\beta = -(q + r)$
Now $(1 + \alpha)(1 + \beta) = 1 + (\alpha + \beta) + \alpha\beta$
$= 1 + q - (q + r)$
$(1 + \alpha)(1 + \beta) = (1 - r)$

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

Let α and $\frac{1}{\alpha}$ the roots

$\therefore \quad \alpha \cdot \frac{1}{\alpha} = \frac{c}{a} \Rightarrow c = a$

75. (D) Let the roots of the equation $4x^2 + x(p + 1) + 1 = 0$ be α and α. Then sum of the roots.

$$\alpha + \alpha = -\frac{P+1}{4} \Rightarrow \alpha = -\frac{P+1}{8} \quad ...(I)$$

and products roots $= \alpha \cdot \alpha = \frac{1}{4}$ ...(II)

from (I) and (II)

$$\therefore \quad \left(-\frac{P+1}{8}\right)^2 = \frac{1}{4} \Rightarrow (P+1)^2 = \frac{64}{4}$$

$\Rightarrow (P + 1)^2 = 16 \Rightarrow P + 1 = \pm 4$

So, $P = 3, -5$

76. (C) If the system of equations $2x + ky = 11$ and $5x - 7y = 5$ has no solution so

$$\Rightarrow \quad \frac{2}{5} = \frac{k}{-7}$$

$$\therefore \quad k = \frac{-7 \times 2}{5} = \frac{-14}{5}$$

77. (B) If one root is α, then the other root is 3α

$$\therefore \quad \alpha + 3\alpha = \frac{-b}{a} \text{ and } \alpha \times 3\alpha = \frac{c}{a}$$

$$\Rightarrow \quad \alpha = \frac{-b}{4a} \quad ...(1)$$

$$\text{and } 3\alpha^2 = \frac{c}{a} \quad ...(2)$$

$$\alpha^2 = \frac{c}{3a}$$

$\Rightarrow$ from (1) and (2)

$$\left(\frac{-b}{4a}\right)^2 = \frac{c}{3a}$$

$$\Rightarrow \quad \frac{b^2}{16a^2} = \frac{c}{3a} \Rightarrow \frac{b^2}{16a} = \frac{c}{3}$$

$\Rightarrow \quad 3b^2 = 16ac$

78. (D) Given $ax(1 - x) = 1$

$\Rightarrow \quad ax - ax^2 = 1$

$\Rightarrow \quad ax^2 - ax + 1 = 0$

for real roots, $a^2 - 4a \geq 0$

$\Rightarrow \quad a(a - 4) \geq 0 \Rightarrow a \leq 0$ or $a \geq 4$

$\Rightarrow$ So $0 < a < 4$, then the given equation has no real roots.

79. (B) Given:

$xy - 3x + 5y + c = 0$

$\Rightarrow \quad y(x + 5) + 1(-3x + c) = 0$

$$\Rightarrow \quad y(x + 5) - 3\left(x - \frac{c}{3}\right) = 0$$

$\Rightarrow \quad (y - 3)(x + 5) = 0$

if $\frac{-c}{3} = 5$, i.e., $c = -15$

80. (D) According to the question:

$x < 2$

Option (A) x is negative but x can be 1; so false.

Option (B) 2x is greater than or equal to x, if $x = -1$ so $2x = -2$; this is less than x so false.

Option (C) x^2 is greater than or equal to x.

Step 1) if $x = 1.5$ so $x^2 = 2.25$ which is greater than x (True)

Step 2) if $x = 1$ so $x^2 = 1$ which is equal to x (True)

Step 3) if $x = 0.05$. so $x^2 = 0.25$, which is less than x so false

Exercise

1. $\frac{x}{(b-c)(b+c-2a)} = \frac{y}{(c-a)(c+a-2b)} = \frac{z}{(a-b)(a+b-2c)}$ then the value of $(x+y+z)$ is :
   (A) $a+b+c$ (B) 0
   (C) 1 (D) 15

2. $\frac{(a+b)^2-(a-b)^2}{a^2b-ab^2}$ is equal to :
   (A) $\frac{1}{a-b}$ (B) $\frac{2}{a-b}$
   (C) $\frac{4}{a-b}$ (D) $\frac{1}{ab}$

3. If $a+b+c=0$ then $a^2+b^2+c^2$ is:
   (A) 0 (B) $2(a^2-bc)$
   (C) $-4(ab+bc+ca)$
   (D) $-2(ab+bc+ca)$

4. If $x=\frac{a-b}{a+b}$, $y=\frac{b-c}{b+c}$, $z=\frac{c-a}{c+a}$, then find the value. $\frac{x+1}{x-1}\times\frac{y+1}{y-1}\times\frac{z+1}{z-1}$
   (A) 1 (B) 0
   (C) -1 (D) 3

5. If $3^x+3^{x+1}=36$ then the value of x^x is :
   (A) 64 (B) 3125
   (C) 81 (D) 4

6. $x^{29}-x^{25}+x^{13}-1$ is divisible by:
   (A) $(x+1)$ but not by $(x-1)$
   (B) $(x-1)$ but not by $(x+1)$
   (C) both $(x+1)$ and $(x-1)$
   (D) neither $(x-1)$ nor $(x+1)$

7. Find the value of k, if $(x+2)$ exactly divides x^3+6x^2+4x+k.
   (A) 4 (B) 6
   (C) -8 (D) -10

8. If $x=a+\frac{1}{a}$ and $y=a-\frac{1}{a}$. Find the value of $x^4+y^4-2x^2y^2$ is:
   (A) 14 (B) 16
   (C) 10 (D) 18

9. If $a^4+b^4=a^2b^2$. Find the value of (a^6+b^6) is :
   (A) 0 (B) 1
   (C) -1 (D) 2

10. If $a+b+c=0$. Find the value of $\frac{a^2}{bc}+\frac{b^2}{ca}+\frac{c^2}{ab}$ is:
    (A) 3 (B) -3
    (C) -1 (D) 1

11. If $a=-1.21$, $b=-2.12$ and $c=3.33$ Find the value of $a^3+b^3+c^3-3abc$.
    (A) 0 (B) 1
    (C) 2 (D) 3

12. If $x^{\frac{1}{3}}+y^{\frac{1}{3}}=z^{\frac{1}{3}}$. Find the value of $(x+y-z)^3+27xyz$ is:
    (A) 0 (B) 1
    (C) -1 (D) 27

13. If $(a-1)^2+(b+2)^2+(c+1)^2=0$ .Then the value of $2a-3b+7c$ is:
    (A) 12 (B) 3
    (C) -11 (D) 1

14. $(y-z)^3+(z-x)^3+(x-y)^3$ is equal to:
    (A) $3(y-z)(z+x)(y-x)^3$
    (B) $(x-y)(y+z)(x-z)$
    (C) $3(y-z)(z-x)(x-y)$
    (D) $(y-z)(z-x)(x-y)$

15. If $x = b + c - 2a$, $y = c + a - 2b$, $z = a + b - 2c$, then the value of $x^2 + y^2 - z^2 + 2xy$ is:

(A) 0 (B) $a + b + c$

(C) $a - b + c$ (D) $a + b - c$

16. If $a^4 + a^2b^2 + b^4 = 8$ and $a^2 + ab + b^2 = 4$ then the value of ab is:

(A) -1 (B) 0

(C) 2 (D) 1

17. If $a^2 + b^2 + c^2 = 2(a - b - c) - 3$ then the value of $(a - b + c)$ is:

(A) -1 (B) 3

(C) 1 (D) -2

18. If $x^a x^b x^c = 1$ then the value of $a^3 + b^3 + c^3$ is:

(A) a (B) abc

(C) $a + b + c$ (D) $3abc$

19. If $a^x = b$, $b^y = c$ and $c^z = a$ then the value of xyz is:

(A) 0 (B) 1

(C) $x + y + z$ (D) abc

20. The value of $\frac{1}{1 + p + q^{-1}} + \frac{1}{1 + q + r^{-1}} + \frac{1}{1 + r + p^{-1}}$ given that $pqr = 1$ is:

(A) 1 (B) 0

(C) pqr (D) $p + q + r$

21. The value of $\frac{1}{x^b + x^{-c} + 1} + \frac{1}{x^c + x^{-a} + 1} + \frac{1}{x^a + x^{-b} + 1}$ given that $a + b + c = 0$ is:

(A) 1 (B) 0

(C) abc (D) x

22. If $a^x = (x + y + z)^y$, $a^y = (x + y + z)^z$, $a^z = (x + y + z)^x$ then :

(A) $3(x + y + z) = a$

(B) $x + y + z = 0$

(C) $2a = x + y + z$

(D) $x = y = z = \frac{a}{3}$

23. If $a + b + c = 3$, $a^2 + b^2 + c^2 = 6$ and $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1$ then abc is :

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$

(C) $\frac{3}{2}$ (D) 1

24. If $a^3 + b^3 = 0$ & $a + b \neq 0$ then

(A) $a + b = \sqrt{2ab}$ (B) $a + b = a^2b^2$

(C) $a + b = \sqrt{ab}$

(D) $a + b = \sqrt{3ab}$

25. If $\frac{7x - 3}{x} + \frac{7y - 3}{y} + \frac{7z - 3}{z} = 0$ then the value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ is

(A) 7 (B) 9

(C) 1 (D) 0

26. If $2^x = 4^y = 8^z$ and $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{4z} = 4$ then the value of x is :

(A) $\frac{7}{16}$ (B) $\frac{16}{7}$

(C) $\frac{9}{16}$ (D) $\frac{16}{9}$

27. If $a + b + c = 0$, $a^2 + b^2 + c^2 = 14$ find

the value of $bc + ca + ab$ is :

(A) -7 (B) $\frac{-7}{2}$

(C) - 8 (D) - 14

28. If $\frac{1}{x+\frac{1}{y+\frac{1}{z}}} = \frac{1}{\frac{67}{16}}$ then find the value of $xy+z$.

(A) 20 (B) 21

(C) 22 (D) 23

29. If $\left(x+\frac{1}{x}\right)^2 = 3$, then the value of $x^{206} + x^{200} + x^{90} + x^{84} + x^{18} + x^{12} + 1$ is :

(A) 84 (B) 206

(C) 0 (D) 1

30. If $\left(x+\frac{1}{x}\right) = \sqrt{3}$, then the value of $x^{506} + x^{500} + x^{384} + x^{378} + x^{190} + x^{184} + x^{18} + x^{12}$ is:

(A) 84 (B) 206

(C) 0 (D) 1

31. If $x = \sqrt{\frac{\sqrt{5}+1}{\sqrt{5}-1}}$, then $x^2 - x - 1$ is equal to :

(A) 2 (B) 5

(C) 0 (D) 1

32. If $x + \frac{a}{x} = 1$, then the value of $\frac{x^2 + x + a}{x^3 - x^2}$ is :

(A) $\frac{2}{a}$ (B) $-\frac{2}{a}$

(C) - 2 (D) $-\frac{a}{2}$

33. If $5x^2 - 4xy + y^2 - 2x + 1 = 0$, then the value of x and y are :

(A) $x = 1, y = 2$ (B) $x = 2, y = 1$

(C) $x = 1, y = -1$ (D) $x = -1, y = 1$

34. If $x + \frac{1}{x} = a$, then what is the value of $x^3 + x^2 + \frac{1}{x^3} + \frac{1}{x^2}$?

(A) $a^3 + a^2$

(B) $a^3 + a^2 - 5a$

(C) $a^3 + a^2 - 3a - 2$

(D) $a^3 + a^2 - 4a - 2$

35. If $a^x = b$, $b^y = c$ and $xyz = 1$ then that is the value of c^z ?

(A) a (B) b

(C) ab (D) a/b

36. If $(3.7)^x = (0.037)^y = 10000$, then what is the value of $\frac{1}{x} - \frac{1}{y}$?

(A) 1 (B) 2

(C) 1/2 (D) 1/4

37. If $p^x = r^y = m$ and $r^w = p^z = n$, then which one of the following is correct :

(A) $xw = yz$ (B) $xz = yw$

(C) $x + y = w + z$ (D) $x - y = w - z$

38. If $x = \left(a+\sqrt{a^2+b^3}\right)^{1/3} + \left(a-\sqrt{a^2+b^3}\right)^{1/3}$ then what is the value of $x^3 + 3bx - 2a$?

(A) $2a^3$ (B) $-2a^3$

(C) 1 (D) 0

39. If $x+\frac{1}{x}=\sqrt{3}$ then the value of $x^{17}+\frac{1}{x^{17}}$ is :

(A) $\sqrt{3}$ (B) $-\sqrt{3}$
(C) 1 (D) 0

40. If $x+\frac{1}{x}=\sqrt{3}$ then the value of $x^6+\frac{1}{x^6}+2$ is:

(A) $\sqrt{3}$ (B) 2
(C) 1 (D) 0

41. If $x=2^{\frac{1}{3}}+2^{-\frac{1}{3}}$ then the value of $2x^3-6x$ will be:

(A) 5 (B) – 5
(C) 1 (D) 0

42. The least positive integer that should be subtracted from 2022 × 2023 so that the difference is a perfect square is :

(A) 2022 (B) 2023
(C) 2021 (D) 2024

43. If $a^2=by+cz$, $b^2=cz+ax$ and $c^2=ax+by$ then the value of $\frac{x}{a+x}+\frac{y}{b+y}+\frac{z}{c+z}$ is :

(A) $a+b+c$ (B) $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}$
(C) 1 (D) 0

44. If $x+\frac{1}{x}=1$, then the value of $x^{12}+x^9+x^6+x^3+1$ is :

(A) -1 (B) -2
(C) 1 (D) 2

45. If $\frac{x}{1}=\frac{\sqrt{m+3n}+\sqrt{m-3n}}{\sqrt{m+3n}-\sqrt{m-3n}}$. Then find the value $2mx-3nx^2$ = ?

(A) $3n$ (B) $3m$
(C) $2n$ (D) $2m$

46. $\frac{x+y+z}{x^{-1}y^{-1}+y^{-1}z^{-1}+z^{-1}x^{-1}}$ is equal to :

(A) $\frac{1}{xyz}$ (B) $\frac{z}{xy}+\frac{x}{yz}+\frac{y}{xz}$
(C) $\frac{1}{xy}+\frac{1}{yz}+\frac{1}{xz}$ (D) xyz

47. If $a+b+c=0$ then the value of $\frac{a^2+b^2+c^2}{c^2-ab}$ is :

(A) 0 (B) 1
(C) 2 (D) –2

48. If $2^a+3^b=17$ and $2^{a+2}-3^{b+1}=5$ the then the value of a and b :

(A) 4, 3 (B) 3, 2
(C) 2, 3 (D) 1, 0

49. If $\frac{x}{(2x+y+z)}=\frac{y}{(x+2y+z)}=\frac{z}{x+y+2z}=a$ and $x+y+z\neq 0$ then the value of a is :

(A) $\frac{1}{3}$ (B) $\frac{1}{4}$
(C) $\frac{1}{2}$ (D) $\frac{1}{8}$

50. Find the value of x if $\frac{x^3+3x}{3x^2+1}=\frac{189}{61}$.

(A) ±9 (B) 9
(C) 1 (D) 0

51. If $a^2+b^2+c^2=ab+bc+ca$ then the value of $a^3+b^3+c^3$ is :

(A) $3abc$ (B) $3a^2b^2c^2$

(C) $-3(abc)$

(D) None of these

52. If $a(x-a^2)-b(x-b^2)=0$, then the value of x is :

(A) $\dfrac{(-a+b)(a^2+ab+b^2)}{a+b}$

(B) $\dfrac{a^3+b^3}{(a-b)}$ (C) $\dfrac{a^3-b^3}{(a+b)}$

(D) a^2+ab+b^2

53. If $ab+bc+ca=0$ then the value of $\left(\dfrac{1}{a^2-bc}+\dfrac{1}{b^2-ca}+\dfrac{1}{c^2-ab}\right)$ is :

(A) 0 (B) 1

(C) 2 (D) –2

54. If $a+b+c=0$ then the value of $\dfrac{a^2+b^2+c^2}{(bc+ca+ab)}$ is :

(A) 0 (B) 1

(C) 2 (D) –2

55. $\dfrac{(x^2-y^2)^3+(y^2-z^2)^3+(z^2-x^2)^3}{(x-y)^3+(y-z)^3+(z-x)^3}$ is equal to

(A) $(x^2-y)(y^2-z^2)(z^2-x^2)$

(B) $3(x-y)(8y-z)(z-x)$

(C) $(x+y)(y+z)(z+x)$

(D) $3(x+y)(y+z)(z+x)$

56. If $x=a^{2/3}-a^{-2/3}$ then the value of x^3+3x is :

(A) $a^2-\dfrac{1}{a^2}$ (B) $a^2+\dfrac{1}{a^2}$

(C) $a+\dfrac{1}{a}$ (D) $a-\dfrac{1}{a}$

57. If $a+b+c=0$ then the value of $\dfrac{1}{a^2+b^2-c^2}+\dfrac{1}{b^2+c^2-a^2}+\dfrac{1}{a^2+c^2-b^2}$ is :

(A) 0 (B) 1

(C) 3 (D) $a+b+c$

58. If $y+\dfrac{1}{z}=1$ and $x+\dfrac{1}{y}=1$ then the value of xyz is :

(A) 1 (B) –1

(C) 0 (D) $\dfrac{1}{2}$

59. If $x^2+y^2+2x+1=0$ then the value of $x^{31}+y^{35}$ is :

(A) –1 (B) 0

(C) 1 (D) 2

60. If $a^2=b+c$, $b^2=c+a$ and $c^2=a+b$ then the value of $\dfrac{1}{1+a}+\dfrac{1}{1+b}+\dfrac{1}{1+c}$ is :

(A) abc (B) $a^2b^2c^2$

(C) 1 (D) 0

61. If $a^2+b^2+2b+4a+5=0$ then the value of $\dfrac{a-b}{a+b}$ is :

(A) 3 (B) – 3

(C) $\dfrac{1}{3}$ (D) $-\dfrac{1}{3}$

62. If $x^2+y^2-4x-4y+8=0$ then the value of $x-y$ is :

(A) 4 (B) – 4

(C) 0 (D) 8

63. If $a^3-b^3-c^3-3abc=0$ then

(A) $a=b=c$

(B) $a+b+c=0$

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

64. If $p = 124$ then the value of $\sqrt[3]{p(p^2+3p+3)+1}$ is :

(A) 5 (B) 7
(C) 123 (D) 125

65. If $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=3$ then the value of $\frac{2a^2+3c^2+4e^2}{2b^2+3d^2+4f^2}$ is :

(A) 2 (B) 3
(C) 4 (D) 9

66. If $a = 25$, $b = 15$, $c = -10$ then the value of $\frac{a^3+b^3+c^3-3abc}{(a-b)^2+(b-c)^2+(c-a)^2}$ is:

(A) 30 (B) −15
(C) − 30 (D) 15

67. If $a^2+b^2=2$ and $c^2+d^2=1$ then the value of $(ad-bc)^2+(ac+bd)^2$ is :

(A) −1 (B) 0
(C) 1 (D) 2

68. If the roots of equation $ax^2-bx+c=0$ are $\sin\theta$ and $\cos\theta$ the which one of following is correct :

(A) $a^2+b^2+2ac=0$
(B) $a^2-b^2+2ac=0$
(C) $a^2-b^2+2ab=0$
(D) $a^2-b^2-2ac=0$

69. If $a=-5$, $b=-6$, $c=10$ then the value of $\frac{(a^3+b^3+c^3)-3abc}{(ab+bc+ca-a^2-b^2-c^2)}$ is :

(A) −1 (B) 0
(C) 1 (D) 2

70. If a, b, c are real number and $a^3+b^3+c^3=3abc$, then relation between a, b, c is

(A) $a+b=c$ (B) $a+c=b$
(C) $a=b=c$ (D) $b+c=a$

71. If $a+b+c=0$ then the value of $\frac{3(a+b)(b+c)(c+a)}{abc}$ is :

(A) 3 (B) − 1
(C) 1 (D) − 3

72. If $ax^2+bx+c=a(x-p)^2$ then relation between a, b, c is:

(A) $abc=1$ (B) $b^2=4ac$
(C) $b^2=ac$ (D) $2b=a+c$

73. If $\frac{a}{1-a}+\frac{b}{1-b}+\frac{c}{1-c}=1$ then find the value $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}$

(A) 0 (B) 1
(C) 3 (D) 4

74. If $\frac{x+\sqrt{x^2-1}}{x-\sqrt{x^2-1}}+\frac{x-\sqrt{x^2-1}}{x+\sqrt{x^2-1}}=14$ then find the value x

(A) 0 (B) ±1
(C) ±2 (D) ±3

75. Find the value of $\frac{a}{b}+\frac{b}{a}$ if $(a^2+b^2)^3 = (a^3+b^3)^2$.

(A) $-\frac{2}{3}$ (B) $\frac{2}{3}$
(C) 0 (D) 1

76. If $x=\frac{\sqrt[3]{m+1}+\sqrt[3]{m-1}}{\sqrt[3]{m+1}-\sqrt[3]{m-1}}$ then find the value of x^3-3mx^2+3x-m.

(A) 0 (B) 1
(C) 2 (D) −1

77. What is the minimum value of $(x-9)(x-2)$ =?

(A) 0 (B) $\frac{49}{4}$

(C) $-\frac{49}{4}$ (D) 9

78. Find the value $a^2+b^2+c^2-ab-bc-ca$ if $a=997$, $b=998$, $c=999$

(A) 3 (B) 0

(C) 1 (D) –3

79. $\frac{13}{37}=\frac{1}{x+\frac{1}{y+\frac{1}{z}}}$, then find the value of x, y and z respctively.

(A) $2,1,\frac{11}{2}$ (B) $\frac{11}{2},1,2$

(C) $\frac{11}{2},2,1$ (D) $2,\frac{11}{2},1$

80. If $x^2+2=2x$, then find the value $x^4-x^3+x^2+1$

(A) ±1 (B) 1

(C) –1 (D) 0

81. If $x=5-2\sqrt{6}$ and $xy=1$, then find the value $\frac{x^3+3xy+y^3}{x^2-2xy+y^2}$

(A) $\frac{976}{93}$ (B) $\frac{973}{96}$

(C) $\frac{976}{96}$ (D) $\frac{973}{93}$

82. If $x+\frac{1}{x}=3$, then find the value of $\frac{7x}{x^2+1-2x}$.

(A) 7 (B) – 7

(C) 1 (D) 0

83. If $x+\frac{1}{x}=5$, then find the value of $\frac{5x}{7x^2-3x+7}$.

(A) $\frac{5}{32}$ (B) $\frac{32}{5}$

(C) 0 (D) 1

84. If $\frac{2P}{P^2-2P+1}=\frac{1}{4}$, then find the value of $P+\frac{1}{P}$.

(A) 1 (B) 0

(C) 10 (D) – 10

85. Solve $\frac{1+876543\times876545}{876544\times876544}$.

(A) 1 (B) 0

(C) – 1 (D) 2

86. If $x=16$, then find the value of $(x^4-17x^3+17x^2-17x+17)$.

(A) 1 (B) 0

(C) 3 (D) 2

87. If $x=12$, then find the value of $(x^4-13x^3+15x^2-13x+13)$.

(A) 17 (B) 289

(C) – 289 (D) 0

88. Find the value of $\left[999\frac{95}{99}\right]\times99$.

(A) 98896 (B) 99996

(C) 98996 (D) 89996

89. For what value of K given equation will be a perfect, $[(2a)(4a)(10a)(11a)+ka^4)]$.

(A) 30 (B) 20

(C) 36 (D) 42

90. If $x^4+\frac{1}{x^4}=119$, then find the value of $x+\frac{1}{x}$.

(A) $\sqrt{13}$ (B) $-\sqrt{13}$
(C) 1 (D) 0

91. If $x+\frac{1}{x}=5$, then find the value of $x^2-\frac{1}{x^2}$.

(A) 3 (B) 7
(C) $-5\sqrt{21}$ (D) $5\sqrt{21}$

92. If $x+\frac{1}{x}=1$, then find the value of x^3.

(A) -1 (B) 0
(C) 2 (D) 1

93. If $x+\frac{1}{x}=1$, then find the value of $x^{17}+\frac{1}{x^{17}}$.

(A) 0 (B) 1
(C) -1 (D) 2

94. If $x+\frac{1}{x}=1$, then find the value of $(x^{208}+x^{205}+x^{204}+x^{201})$.

(A) 0 (B) 1
(C) -1 (D) 2

95. If $x+\frac{1}{x}=5$, then find the value of $\frac{x^4+3x^3+5x^2+3x+1}{x^4+1}$.

(A) $\frac{26}{43}$ (B) $\frac{23}{43}$
(C) $\frac{43}{23}$ (D) $\frac{46}{26}$

96. If $x^4+\frac{1}{x^4}=194$, then find the value of $x^3+\frac{1}{x^3}$.

(A) 76 (B) 26
(C) 64 (D) 52

97. If $x^4+\frac{1}{x^4}=119$, then find the value of $x^3+\frac{1}{x^3}$.

(A) $10\sqrt{13}$ (B) $-10\sqrt{13}$
(C) 0 (D) 1

98. If $x+\frac{1}{x}=5$, then find the value of $x^3-\frac{1}{x^3}$.

(A) $-24\sqrt{21}$ (B) 1
(C) $24\sqrt{21}$ (D) 0

99. $x+\frac{1}{x}=\sqrt{3}$, then find the value of $x^3+\frac{1}{x^3}$.

(A) 0 (B) 1
(C) 3 (D) 4

100. If $x+\frac{1}{x}=\sqrt{3}$, then find the value of $x^{17}+\frac{1}{x^{17}}$.

(A) $\sqrt{3}$ (B) 0
(C) 1 (D) $-\sqrt{3}$

101. If $x+\frac{1}{x}=\sqrt{3}$, then find the value of $x^{208}+x^{202}$.

(A) 0 (B) 1
(C) $\sqrt{3}$ (D) $-\sqrt{3}$

102. If $x+\frac{1}{x}=3$, then find the value of $x^5+\frac{1}{x^5}$.

(A) 123 (B) 1
(C) 0 (D) 127

103. If $x = 7 + 4\sqrt{3}$, then find the value of $\sqrt{x}$.
(A) $2+\sqrt{3}$ (B) $2-\sqrt{3}$
(C) 0 (D) 1

104. If $x = 11 + 6\sqrt{3}$, then find the value of $\sqrt{x}$.
(A) $2+\sqrt{3}$ (B) $3-\sqrt{2}$
(C) $3+\sqrt{2}$ (D) $2-\sqrt{3}$

105. If $x = 22 + 8\sqrt{6}$, then find the value of $\sqrt{x}$.
(A) $4+\sqrt{6}$ (B) $4-\sqrt{6}$
(C) $6+\sqrt{7}$ (D) $7-\sqrt{6}$

106. $x = 97 + 8\sqrt{6}$, then find the value of $\sqrt{x}$.
(A) $4-\sqrt{6}$ (B) $4\sqrt{6}+1$
(C) $4\sqrt{6}-1$ (D) $4+\sqrt{6}$

107. If $x = 38 + 5\sqrt{3}$, then find the value of $\sqrt{x}$.
(A) 1 (B) 0
(C) $\frac{5\sqrt{3}+1}{\sqrt{2}}$ (D) $\frac{5\sqrt{3}-1}{\sqrt{2}}$

108. If $x = \frac{\sqrt{3}}{2}$, then find the value of $\sqrt{1+x}$.
(A) $\frac{\sqrt{3}+1}{2}$ (B) $\frac{\sqrt{3}-1}{2}$
(C) $2-\sqrt{3}$ (D) $2+\sqrt{3}$

109. If $a^3 + b^3 + c^3 - 3abc = 0$ and $a+b+c \neq 0$ find $a + b + c$.
(A) $a = b = c$ (B) $a + b = c$
(C) $a + c = b$ (D) $a = b + c$

110. If a, b, c are the sides of a triangle. Find the type of triangle if $a^2 + b^2 + c^2 = ab+bc+ca$.
(A) Equilateral (B) Right angle
(C) Isosceles
(D) None of these

111. If $a = 997$, $b = 998$ and $c = 999$, then find the value of $a^3 + b^3 + c^3 - 3abc$.
(A) 0 (B) 8982
(C) 1 (D) 4491

112. If $a = 36$, $b = 36$ and $c = 37$, then find the value of $a^3 + b^3 + c^3 - 3abc$.
(A) 0 (B) 1
(C) 218 (D) 109

113. If $a + b + c = 0$, then find the value of $\frac{a^2+b^2+c^2}{a^2-bc}$.
(A) 0 (B) 1
(C) 2 (D) 3

114. If $x^{\frac{1}{4}} + \frac{1}{x^{\frac{1}{4}}} = 1$, then find the value of $x^{1024} + \frac{1}{x^{1024}}$.
(A) 0 (B) -1
(C) 1 (D) 2

115. If $x = 3 + 2\sqrt{2}$ and $xy = 1$, then find the value of $\frac{x^3+3xy+y^3}{x^2-2xy+y^2}$.
(A) $\frac{209}{11}$ (B) $\frac{209}{37}$
(C) $\frac{205}{37}$ (D) $\frac{201}{32}$