

## IX Homework-5

1) Write the co-efficient of  $x^2$  in

(i)  $2 - x^2 + x^3$  (ii)  $\sqrt{2}x - 1$

2) How many zeroes does quadratic polynomial has?

3) Is  $x^2 + \frac{4x^{3/2}}{\sqrt{x}}$  a polynomial? Justify

4) Find the value of polynomial  $12x^2 - 7x + 1$ , when  $x = \frac{1}{4}$

5) Find the zero of the polynomial  $p(x) = 3x - 4$ .

6) Give an example of a polynomial which is

(i) monomial of degree 1

(ii) binomial of degree 20

(iii) trinomial of degree 2

7) If  $f(z) = z^2 - 2\sqrt{3}z - 1$ , then find  $f(2\sqrt{3})$

8) The zero of  $p(x) = 2x - 7$  is (a)  $7/2$  (b)  $2/7$  (c)  $-2/7$  (d)  $-7/2$

9) Which are the zeroes of the polynomial  $(x-1)(x-2)$ ?

(a)  $(1, -2)$  (b)  $(-1, 2)$  (c)  $(-2, 2)$  (d)  $(1, 2)$

10) The value of  $p(y) = y^2 - y + 1$  for  $p(0)$  is

(a)  $-1$  (b)  $1$  (c)  $0$  (d)  $2$

11) Find the value of polynomial  $4x^2 - 5x + 9$ , when  $x = 1$

12) Find the zeroes of the polynomial  $p(x) = x(x+2)(x+3)^2$

13) If  $f(t) = t^3 + \sqrt{2}t^2 + 3\sqrt{2}t - 1$ , then evaluate  $f(2\sqrt{2})$

14) If  $f(x) = x - 9$ , find  $f(x) - f(-2)$

15) Find  $p(-\frac{2}{3})$  for  $p(y) = 2y^3 - y^2 - 13y - 6$

16) Find the value of  $p(x) = 8x^3 - 6x^2 - 4x + 3$ , when

(i)  $x = \sqrt{2}$  (ii)  $x = -\frac{1}{2}$

17) Evaluate:  $\frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \frac{1}{\sqrt{4}+\sqrt{3}} + \dots + \frac{1}{\sqrt{9}+\sqrt{8}}$

18) If  $a = 8 + 3\sqrt{7}$  and  $b = \frac{1}{a}$ , then find the value of  $a^2 + b^2$

19) Simplify:  $128^{-2/7} - (625^{-3})^{-1/4} + 14(2401)^{-1/4}$

20) If  $a = \frac{\sqrt{2}+1}{\sqrt{2}-1}$  and  $b = \frac{\sqrt{2}-1}{\sqrt{2}+1}$ , then find  $a^2 + b^2 - 4ab$

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1) (i) -1  
(ii) 0

2) At most 2

3)  $x^2 + \frac{4x^{\frac{3}{2}}}{x^{\frac{1}{2}}} = x^2 + 4x^{\frac{3}{2}-\frac{1}{2}} = x^2 + 4x$ , a polynomial of degree 2.

4)  $P\left(\frac{1}{4}\right) = 12 \times \left(\frac{1}{4}\right)^2 - 7 \times \frac{1}{4} + 1 = \frac{12}{16} - \frac{7 \times 4}{4 \times 4} + 1 = \frac{12 - 28 + 16}{16} = \underline{\underline{0}}$

5)  $p(x) = 0$

$$\Rightarrow 3x - 4 = 0$$

$$\Rightarrow 3x = 4$$

$$\therefore x = \frac{4}{3} \text{ is the zero of } p(x)$$

6) (i)  $6x$

(ii)  $x^{20} + 5$

(iii)  $x^2 - 5x + 2$

7)  $f(2\sqrt{3}) = (2\sqrt{3})^2 - 2\sqrt{3} \times 2\sqrt{3} - 1$   
 $= (2\sqrt{3})^2 - (2\sqrt{3})^2 - 1 = -1$

8)  $p(x) = 0$

$$\Rightarrow 2x - 7 = 0$$

$$\Rightarrow 2x = 7$$

$$\therefore x = \frac{7}{2} \text{ (a)}$$

9) Put  $p(x) = (x-1)(x-2) = 0$

$$\Rightarrow x - 1 = 0$$

$$x = 1$$

$$x - 2 = 0$$

$$x = 2 \text{ (d)}$$

10)  $p(0) = 0 - 0 + 1 = 1 \text{ (b)}$

11)  $p\left(\frac{1}{2}\right) = 4\left(\frac{1}{2}\right)^2 - 5\left(\frac{1}{2}\right) + 9 = 4 \times \frac{1}{4} - \frac{5}{2} + 9 = 10 - \frac{5}{2} = \underline{\underline{\frac{15}{2}}}$

12) put  $p(x) = 0$

$$\Rightarrow x(x+2)(x+3) = 0$$

$\therefore$  The zeroes of  $p(x)$  are 0, -2 and -3

13)  $f(2\sqrt{2}) = (2\sqrt{2})^3 + \sqrt{2} \times (2\sqrt{2})^2 + 3\sqrt{2} \times 2\sqrt{2} - 1$   
 $= 16\sqrt{2} + 8\sqrt{2} + 12 - 1$   
 $= 24\sqrt{2} + 11$

$$14) \begin{aligned} f(x) &= x-9 \\ f(-x) &= -x-9 \\ \therefore f(x) - f(-x) &= (x-9) - (-x-9) = x-9 + x+9 \\ &= \underline{\underline{2x}} \end{aligned}$$

$$15) \begin{aligned} p\left(-\frac{2}{3}\right) &= 2\left(-\frac{2}{3}\right)^3 - \left(-\frac{2}{3}\right)^2 - 13\left(-\frac{2}{3}\right) - 6 \\ &= 2 \times \frac{-8}{27} - \frac{4 \times 3}{9 \times 3} + 13 \times \frac{2 \times 1}{3 \times 1} - 6 \times 27 \\ &= \frac{-16 - 12 + 23 - 162}{27} = \frac{23 - 190}{27} = \underline{\underline{\frac{-167}{27}}} \end{aligned}$$

$$16) \text{ (i) } \begin{aligned} p(\sqrt{2}) &= 8(\sqrt{2})^3 - 6(\sqrt{2})^2 - 4(\sqrt{2}) + 3 \\ &= 16\sqrt{2} - 12 - 4\sqrt{2} + 3 = 12\sqrt{2} - 9 \end{aligned}$$

$$\text{ (ii) } \begin{aligned} p\left(-\frac{1}{2}\right) &= 8\left(-\frac{1}{2}\right)^3 - 6\left(-\frac{1}{2}\right)^2 - 4\left(-\frac{1}{2}\right) + 3 \\ &= -\frac{8^1}{8^1} - \frac{6^3}{4^2} + \frac{4^2}{2} + 3 = -1 - \frac{3}{2} + 5 = 4 - \frac{3}{2} = \underline{\underline{\frac{5}{2}}} \end{aligned}$$

$$17) \begin{aligned} &\frac{1(\sqrt{2}-1)}{(\sqrt{2}+1)(\sqrt{2}-1)} + \frac{1 \times (\sqrt{3}-\sqrt{2})}{(\sqrt{3}+\sqrt{2})(\sqrt{3}-\sqrt{2})} + \frac{1 \times (\sqrt{4}-\sqrt{3})}{(\sqrt{4}+\sqrt{3})(\sqrt{4}-\sqrt{3})} + \frac{1 \times (\sqrt{5}-\sqrt{4})}{(\sqrt{5}+\sqrt{4})(\sqrt{5}-\sqrt{4})} \\ &+ \frac{1 \times (\sqrt{6}-\sqrt{5})}{(\sqrt{6}+\sqrt{5})(\sqrt{6}-\sqrt{5})} + \frac{1 \times (\sqrt{7}-\sqrt{6})}{(\sqrt{7}+\sqrt{6})(\sqrt{7}-\sqrt{6})} + \frac{1 \times (\sqrt{8}-\sqrt{7})}{(\sqrt{8}+\sqrt{7})(\sqrt{8}-\sqrt{7})} + \frac{1(\sqrt{9}-\sqrt{8})}{(\sqrt{9}+\sqrt{8}) \times (\sqrt{9}-\sqrt{8})} \\ &= \frac{\sqrt{2}-1}{2-1} + \frac{\sqrt{3}-\sqrt{2}}{3-2} + \frac{\sqrt{4}-\sqrt{3}}{4-3} + \frac{\sqrt{5}-\sqrt{4}}{5-4} + \frac{\sqrt{6}-\sqrt{5}}{6-5} + \frac{\sqrt{7}-\sqrt{6}}{7-6} + \frac{\sqrt{8}-\sqrt{7}}{8-7} + \frac{\sqrt{9}-\sqrt{8}}{9-8} \\ &= \sqrt{2}-1 + \sqrt{3}-\sqrt{2} + \cancel{2}-\sqrt{3} + \sqrt{4}-\cancel{2} + \sqrt{5}-\sqrt{4} + \sqrt{6}-\sqrt{5} + \sqrt{7}-\sqrt{6} + \sqrt{8}-\sqrt{7} + 3-\sqrt{8} \\ &= 3-1 = \underline{\underline{2}} \end{aligned}$$

$$18) \begin{aligned} b &= \frac{1}{8+3\sqrt{7}} = \frac{8-3\sqrt{7}}{8^2-(3\sqrt{7})^2} = \frac{8-3\sqrt{7}}{64-63} = 8-3\sqrt{7} \end{aligned}$$

$$\begin{aligned} a^2+b^2 &= (a+b)^2 - 2ab \\ &= (8+3\sqrt{7}+8-3\sqrt{7})^2 - 2(8+3\sqrt{7})(8-3\sqrt{7}) \\ &= 16^2 - 2(64-63) = 256 - 2 = \underline{\underline{254}} \end{aligned}$$

$$19) \begin{aligned} &2^{\frac{7 \times 2}{7^1}} - 5^{\frac{4 \times 3 \times 1}{4^1}} + 14 \times 7^{\frac{4 \times 1}{7^1}} \\ &= 2^{-2} - 5^3 + 14 \times 7^{-1} = \frac{1}{4} - 125 + \frac{14}{7} = \frac{1}{4} - 123 = \underline{\underline{\frac{-491}{4}}} \end{aligned}$$

$$20) \quad a^2 + b^2 - 4ab = (a+b)^2 - 2ab - 4ab = (a+b)^2 - 6ab$$

$$a = \frac{(\sqrt{2}+1)^2}{2-1} = 2+1+2\sqrt{2} = 3+2\sqrt{2}$$

$$b = \frac{(\sqrt{2}-1)^2}{2-1} = 2+1-2\sqrt{2} = 3-2\sqrt{2}$$

$$\begin{aligned} \therefore a^2 + b^2 - 4ab &= (3+2\sqrt{2}+3-2\sqrt{2})^2 - 6(3+2\sqrt{2})(3-2\sqrt{2}) \\ &= 6^2 - 6(9-8) = 36 - 6 = \underline{\underline{30}} \end{aligned}$$

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