

ALGEBRA - 2

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UNIT TEST : 1ST (ANSWERS)

$$\begin{array}{ll} \text{Q. 2) (4)} & x = \frac{7y-1}{2} \\ & 2x = 7y - 1 \\ & 2x - 7y = -1 \quad \dots (\text{I}) \end{array} \quad \& \quad \begin{array}{l} \frac{x-y}{7} = \frac{x-2y}{4} \\ 4(x-y) = 7(x-2y) \\ 4x-4y = 7x-14y \\ \therefore -3x+10y = 0 \quad \dots (\text{II}) \end{array}$$

Multiplying equation (I) by 3 & equation (II) by 2

$$\begin{array}{ll} 6x - 21y = -3 & \dots (\text{III}) \\ -6x + 20y = 0 & \dots (\text{IV}) \end{array}$$

Adding equation (III) & (IV)

$$\begin{array}{rcl} 6x - 21y = -3 & \dots (\text{III}) \\ + 6x + 20y = 0 & \dots (\text{IV}) \\ \hline -y = -3 & & \end{array} \quad \therefore y = 3$$

Substituting $y = 3$ in equation (I)

$$\begin{array}{ll} 2x - 7y = -1 & \dots (\text{I}) \\ 2x - 7(3) = -1 & \\ 2x - 21 = -1 & \\ \therefore 2x = -1 + 21 & \therefore 2x = 20 \quad \therefore x = \frac{20}{2} = [10] \\ \therefore x = 10 \text{ & } y = 3 \text{ is the solution of the given equations.} & \end{array}$$

$$(5) \text{ Let } p(m) = 2m^3 - 5m^2 - 22m - 15 \\ \left(\begin{array}{l} \text{the sum of the} \\ \text{coefficients of odd} \\ \text{power in } p(m) \end{array} \right) = \left(\begin{array}{l} \text{the sum of the} \\ \text{coefficients of even} \\ \text{powers of } p(m) \end{array} \right) \\ = -20$$

$\therefore (m+1)$ is a factor of $p(m)$

Let us find the other factor by synthetic division.

$$\begin{array}{c|cccc} -1 & 2 & -5 & -22 & -15 \\ & \hline & -2 & 7 & 15 \\ & 2 & -7 & -15 & (0) = R \end{array}$$

$$\begin{array}{ll} \therefore \text{the other factor} & = 2m^2 - 7m - 15 \\ & = 2m^2 - 10m + 3m - 15 \\ & = 2m(m-5) + 3(m-5) \\ & = (m-5)(2m+3) \end{array}$$

$$\therefore p(m) = 2m^3 - 5m^2 - 22m - 15 \\ = (m+1)(m-5)(2m+3)$$

$$(6) \frac{y^2-3y+2}{y^2-5y+4} + \frac{y^2-5y+6}{y^2-9y+20} \\ = \frac{(y-1)(y-2)}{(y-1)(y-4)} + \frac{y^2-5y+6}{(y-4)(y-5)}$$

$$\begin{aligned} &= \frac{y-2}{y-4} + \frac{y^2-5y+6}{(y-4)(y-5)} \\ &= \frac{(y-2)(y-5) + (y^2-5y+6)}{(y-4)(y-5)} \\ &= \frac{y^2-7y+10+y^2-5y+6}{(y-4)(y-5)} \end{aligned}$$

$$\begin{aligned} &= \frac{2y^2-12y+16}{(y-4)(y-5)} = \frac{2(y^2-6y+8)}{(y-4)(y-5)} \\ &= \frac{2(y-2)(y-4)}{(y-4)(y-5)} \end{aligned}$$

$$= \frac{2(y-2)}{(y-5)}$$

$$\text{Q. 3 (1) G.C.D.} = (x+3)$$

$$\text{L.C.M.} = x^3 - 7x + 6 = x^3 + 0x^2 - 7x^1 + 6x^0$$

The sum of the coefficient is zero

$\therefore (x-1)$ is a factor at the polynomial.

Let us find the other factor by synthetic division.

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$$\begin{array}{c|cccc} 1 & 1 & 0 & -7 & 6 \\ & & 1 & 1 & -6 \\ \hline & 1 & 1 & -6 & (0) = R \end{array}$$

$$\therefore \text{the other factor} = x^2 + x - 6 \\ = (x+3)(x-2)$$

$$\therefore \text{L.C.M.} = (x-1)(x+3)(x-2) \quad \frac{1}{2}$$

$$p(x) = x^2 + 2x - 3 = (x+3)(x-1) \dots \text{given} \quad \frac{1}{2}$$

$q(x)$ is to be found.

$$p(x) \times q(x) = \text{HCF} \times \text{LCM} \quad \frac{1}{2}$$

$$(x+3)(x-1) \times q(x) = (x+3) \times (x-1)(x+3)(x-2) \quad \frac{1}{2}$$

$$\therefore q(x) = (x+3)(x-2) \dots \text{(Dividing both the sides by } (x+3)(x-1)) \quad \frac{1}{2}$$

$$= x^2 + x - 6 \quad \frac{1}{2}$$

$$\therefore \text{The other polynomial} = x^2 + x - 6 \quad \frac{1}{2}$$

$$(2) y = 2x - 19 \quad \frac{1}{2}$$

$$\therefore 2x - y = 19 \quad (\text{I})$$

$$2x - 3y + 3 = 0$$

$$2x - 3y = -3 \quad (\text{II})$$

$$\therefore D = \begin{vmatrix} 2 & -1 \\ 2 & -3 \end{vmatrix} = 2 \times (-3) - (-1) \times 2 = -6 + 2 = -4 \quad 1$$

$$Dx = \begin{vmatrix} 19 & -1 \\ -3 & -3 \end{vmatrix} = 19 \times (-3) - (-1) \times (-3) = -57 - 3 = -60 \quad 1$$

$$Dy = \begin{vmatrix} 2 & 19 \\ 2 & -3 \end{vmatrix} = 2 \times (-3) - 2 \times 19 = -6 - 38 = -44 \quad 1$$

Applying Cramer's Rule

$$\therefore x = \frac{Dx}{D} = \frac{-60}{-4} = 15 \quad \& \quad y = \frac{Dy}{D} = \frac{-44}{-4} = [11] \quad 1$$

\therefore the solution of the given equations : $x = 15$ & $y = 11$

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

$$= \left[\frac{(1+y)^2 - (1-y)^2}{(1-y)(1+y)} + \frac{4y}{1+y^2} \right] \div \frac{2y^4}{1-y^4} \quad \frac{1}{2}$$

$$= \left[\frac{1+2y+y^2 - 1+2y-y^2}{1-y^2} + \frac{4y}{1+y^2} \right] \div \frac{2y^4}{1-y^4} \quad \frac{1}{2}$$

$$= \left[\frac{4y}{1-y^2+1+y^2} \right] \div \frac{2y^4}{1-y^4} \quad \frac{1}{2}$$

$$= 4y \left[\frac{1}{(1-y^2)(1+y^2)} \right] \times \frac{1-y^4}{2y^4} \quad \frac{1}{2}$$

$$= 4 \left[\frac{1}{(1-y^4)} \right] \times \frac{(1-y^4)}{y^3} \quad \frac{1}{2}$$

$$= \frac{4}{y^3} \quad \frac{1}{2}$$

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