

Exercise 8.4

Q.1 Divide $5x^3 - 15x^2 + 25x$ by $5x$

Sol:

$$\frac{5x^3 - 15x^2 + 25x}{5x} = \frac{5x^3}{5x} - \frac{15x^2}{5x} + \frac{25x}{5x}$$

$$= x^2 - 3x + 5$$

Q.2 $4z^3 + 6z^2 - z$ by $-\frac{1}{2}z$

Sol:

$$\frac{4z^3 + 6z^2 - z}{(-\frac{1}{2}z)} = \frac{4z^3}{(-\frac{1}{2}z)} + \frac{6z^2}{(-\frac{1}{2}z)} - \frac{z}{(-\frac{1}{2}z)}$$

$$= -8z^2 - 12z + 2$$

Q.3 $9x^2y - 6xy + 12xy^2$ by $-\frac{3}{2}xy$

Sol:

$$\frac{9x^2y - 6xy + 12xy^2}{(-\frac{3}{2}xy)} = \frac{9x^2y}{(-\frac{3}{2}xy)} - \frac{6xy}{(-\frac{3}{2}xy)} + \frac{12xy^2}{(-\frac{3}{2}xy)}$$

$$= -6x + 4 - 8y$$

Q.4 $3x^3y^2 + 2x^2y + 15xy$ by $3xy$

Sol:

$$\frac{3x^3y^2 + 2x^2y + 15xy}{3xy} = \frac{3x^3y^2}{3xy} + \frac{2x^2y}{3xy} + \frac{15xy}{3xy}$$

$$= x^2y + \frac{2}{3}x + 5$$

⑤ Divide $x^2 + 7x + 12$ by $x + 4$

Solution:

$$\begin{array}{r}
 x+3 \\
 x+4 \overline{) x^2+7x+12} \\
 \underline{x^2+4x} \\
 3x+12 \\
 \underline{3x+12} \\
 0
 \end{array}$$

$$\therefore x^2 + 7x + 12 = (x+4)(x+3)$$

⑥ $4y^2 + 3y + \frac{1}{2}$ by $2y+1$

Solution:

$$\begin{array}{r}
 2y + \frac{1}{2} \\
 2y+1 \overline{) 4y^2+3y+\frac{1}{2}} \\
 \underline{4y^2+2y} \phantom{+\frac{1}{2}} \\
 y + \frac{1}{2} \\
 \underline{y + \frac{1}{2}} \\
 0
 \end{array}$$

$$\therefore 4y^2 + 3y + \frac{1}{2} = (2y+1)\left(2y + \frac{1}{2}\right)$$

⑦ Divide $3x^3 + 4x^2 + 5x + 18$ by $x+2$.

Sol:

$$\begin{array}{r}
 3x^2 - 2x + 9 \\
 x+2 \overline{) 3x^3+4x^2+5x+18} \\
 \underline{3x^3+6x^2+12x} \\
 -2x^2-7x+18 \\
 \underline{-2x^2-4x} \\
 9x+18 \\
 \underline{9x+18} \\
 0
 \end{array}$$

⑧ $14x^2 - 53x + 45$ by $7x - 9$

Solution:

$$\begin{array}{r} 2x - 5 \\ 7x - 9 \overline{) 14x^2 - 53x + 45} \\ \underline{14x^2 - 18x} \\ -35x + 45 \\ \underline{-35x + 45} \\ 0 \end{array}$$

$\therefore 14x^2 - 53x + 45 = (7x - 9)(2x - 5)$

⑨ Divide $-21 + 71x - 31x^2 - 24x^3$ by $3 - 8x$

Sol: By arranging dividend and divisor in standard form

$$\begin{array}{r} 3x^2 + 5x - 7 \\ -8x + 3 \overline{) -24x^3 - 31x^2 + 71x - 21} \\ \underline{-24x^3 + 9x^2} \\ -40x^2 + 71x - 21 \\ \underline{-40x^2 + 15x} \\ 56x - 21 \\ \underline{56x - 21} \\ 0 \end{array}$$

$\therefore -24x^3 - 31x^2 + 71x - 21 = (-8x + 3)(3x^2 + 5x - 7)$

Q.10 Divide $3y^4 - 3y^3 - 4y^2 - 4y$ by $y^2 - 2y$

Sol:

$$\begin{array}{r}
 3y^2 + 3y + 2 \\
 y^2 - 2y \overline{) 3y^4 - 3y^3 - 4y^2 - 4y} \\
 \underline{3y^4 - 6y^3} \\
 3y^3 - 4y^2 - 4y \\
 \underline{3y^3 - 6y^2} \\
 2y^2 - 4y \\
 \underline{2y^2 - 4y} \\
 0
 \end{array}$$

$\therefore$ Quotient = $3y^2 + 3y + 2$

Q.11 Divide $2y^5 + 10y^4 + 6y^3 + y^2 + 5y + 3$ by $2y^3 + 1$

Solution:

$$\begin{array}{r}
 y^2 + 5y + 3 \\
 2y^3 + 1 \overline{) 2y^5 + 10y^4 + 6y^3 + y^2 + 5y + 3} \\
 \underline{2y^5} \\
 10y^4 + 6y^3 + y^2 + 5y + 3 \\
 \underline{10y^4} \\
 6y^3 + y^2 + 5y + 3 \\
 \underline{6y^3} \\
 y^2 + 5y + 3 \\
 \underline{y^2 + 5y + 3} \\
 0
 \end{array}$$

Quotient = $y^2 + 5y + 3$

12 $x^4 - 2x^3 + 2x^2 + x + 4$ by $x^2 + x + 1$

Sol:

$$\begin{array}{r}
 x^2 - 3x + 4 \\
 x^2 + x + 1 \overline{) x^4 - 2x^3 + 2x^2 + x + 4} \\
 \underline{x^4 + x^3 + x^2} \\
 -3x^3 + x^2 + x + 4 \\
 \underline{-3x^3 - 3x^2 - 3x} \\
 4x^2 + 4x + 4 \\
 \underline{4x^2 + 4x + 4} \\
 0
 \end{array}$$

Quotient = $x^2 - 3x + 4$

13. Divide $m^3 - 14m^2 + 37m - 26$ by $m^2 - 12m + 3$

Sol:

$$\begin{array}{r}
 m - 2 \\
 m^2 - 12m + 3 \overline{) m^3 - 14m^2 + 37m - 26} \\
 \underline{m^3 - 12m^2 + 3m} \\
 -2m^2 + 34m - 26 \\
 \underline{-2m^2 + 24m - 26} \\
 10m - 0
 \end{array}$$

Quotient = $m - 2$

14 Divide $x^4 + x^2 + 1$ by $x^2 + x + 1$

Sol:

$$\begin{array}{r}
 x^2 - x + 1 \\
 x^2 + x + 1 \overline{) x^4 + x^2 + 1} \\
 \underline{x^4 + x^2 \quad + x^3} \\
 -x^3 + 1 \\
 \underline{-x^3 \quad - x^2 - x} \\
 x^2 + x + 1 \\
 \underline{x^2 + x + 1} \\
 0
 \end{array}$$

$\therefore$ Quotient = $x^2 - x + 1$

(15) Divide $x^5 + x^4 + x^3 + x^2 + x + 1$ by $x^3 + 1$

Sol:

$$\begin{array}{r}
 x^2 + x + 1 \\
 x^3 + 1 \overline{) x^5 + x^4 + x^3 + x^2 + x + 1} \\
 \underline{x^5 + x^2} \\
 x^4 + x^3 + x + 1 \\
 \underline{-x^4 + x} \\
 x^3 + 1 \\
 \underline{x^3 + 1} \\
 0
 \end{array}$$

$\therefore$ Quotient = $x^2 + x + 1$

⑩ Divide each of the following and find the quotient and remainder.

⑩ $14x^3 - 5x^2 + 9x - 1$ by $2x - 1$

Sol:

$$\begin{array}{r}
 7x^2 + x + 5 \\
 2x-1 \overline{) 14x^3 - 5x^2 + 9x - 1} \\
 \underline{14x^3 - 7x^2} \\
 2x^2 + 9x - 1 \\
 \underline{- 2x^2 - x} \\
 10x - 1 \\
 \underline{- 10x + 5} \\
 4
 \end{array}$$

here quotient = $7x^2 + x + 5$, remainder = 4.

⑪ $6x^3 - x^2 - 10x - 3$ by $2x - 3$

Sol:

$$\begin{array}{r}
 3x^2 + 4x + 1 \\
 2x-3 \overline{) 6x^3 - x^2 - 10x - 3} \\
 \underline{6x^3 - 9x^2} \\
 8x^2 - 10x - 3 \\
 \underline{- 8x^2 + 12x} \\
 2x - 3 \\
 \underline{2x - 3} \\
 0
 \end{array}$$

quotient = $3x^2 + 4x + 1$, remainder = 0

(18)

$$6x^3 + 11x^2 - 39x - 65 \text{ by } 3x^2 + 13x + 13$$

Sol:

$$\begin{array}{r}
 2x-5 \\
 \hline
 3x^2+13x+13 \overline{) 6x^3+11x^2-39x-65} \\
 \underline{6x^3+26x^2+26x} \\
 -15x^2-65x-65 \\
 \underline{-15x^2-65x-65} \\
 0
 \end{array}$$

$$\therefore Q = 2x-5, \quad R = 0$$

(19)

$$30x^4 + 11x^3 - 82x^2 - 12x + 48 \text{ by } 3x^2 + 2x - 4$$

Sol:

$$\begin{array}{r}
 10x^2-3x-12 \\
 \hline
 3x^2+2x-4 \overline{) 30x^4+11x^3-82x^2-12x+48} \\
 \underline{30x^4+20x^3-40x^2} \\
 -9x^3-42x^2-12x+48 \\
 \underline{-9x^3-6x^2+12x} \\
 -36x^2-24x+48 \\
 \underline{-36x^2-24x+48} \\
 0
 \end{array}$$

(20)

$$9x^4 - 4x^2 + 4 \text{ by } 3x^2 - 4x + 2$$

Sol:

$$\begin{array}{r}
 3x^2 - 4x + 2 \overline{) 9x^4 - 4x^2 + 4} \\
 \underline{9x^4 + 6x^2 - 12x^3} \\
 12x^3 - 10x^2 + 4 \\
 \underline{12x^3 - 16x^2 + 8x} \\
 6x^2 - 8x + 4 \\
 \underline{6x^2 - 8x + 4} \\
 0
 \end{array}$$

$$\therefore Q = 3x^2 + 4x + 2, \quad R = 0$$

(21) Verify division algorithm

i.e. Dividend = Divisor $\times$ quotient + Remainder, in each of the following. Also write the quotient and Remainder.

(1) Dividend = $14x^2 + 13x - 15$

Divisor = $7x - 4$

Sol:

$$\begin{array}{r}
 7x - 4 \overline{) 14x^2 + 13x - 15} \\
 \underline{14x^2 - 8x} \\
 21x - 15 \\
 \underline{21x - 12} \\
 -3
 \end{array}$$

verification

$$\text{Dividend} = \text{Divisor} \times \text{quotient} + \text{Remainder}$$

$$\begin{aligned} \Rightarrow 14x^2 + 13x - 15 &= (2x-4)(2x+3) + (-3) \\ &= 14x^2 + 21x - 8x - 12 - 3 \\ &= 14x^2 + 13x - 15 \end{aligned}$$

hence verified.

(ii) Dividend = $15z^3 - 20z^2 + 13z - 12$ Divisor = $3z - 6$

Sol.

$$\begin{array}{r} 5z^2 + \frac{10}{3}z + 11 \\ 3z-6 \overline{) 15z^3 - 20z^2 + 13z - 12} \\ \underline{15z^3 - 30z^2} \\ 10z^2 + 13z - 12 \\ \underline{10z^2 - 20z} \\ 23z - 12 \\ \underline{23z - 66} \\ 54 \end{array}$$

$$\therefore \text{Dividend} = \text{Divisor} \times \text{quotient} + \text{Remainder}$$

$$= (3z-6) \times (5z^2 + \frac{10}{3}z + 11) + 54$$

$$= 3z(5z^2 + \frac{10}{3}z + 11) - 6(5z^2 + \frac{10}{3}z + 11) + 54$$

$$= 15z^3 + 10z^2 + 33z - 30z^2 - 20z - 66 + 54$$

$$= 15z^3 - 20z^2 + 13z - 12$$

(iii) Dividend = $6y^5 - 28y^3 + 3y^2 + 30y - 9$

Divisor = $2y^2 - 6$

Sol:

$$\begin{array}{r|l} & 3y^3 - 5y + \frac{3}{2} \\ 2y^2 - 6 & \begin{array}{r} 6y^5 - 28y^3 + 3y^2 + 30y - 9 \\ \underline{6y^5 - 18y^3} \\ -10y^3 + 3y^2 + 30y - 9 \\ \underline{-10y^3 + + 30y} \\ 3y^2 - 9 \\ \underline{3y^2 - 9} \\ 0 \end{array} \end{array}$$

$\therefore Q = 3y^3 - 5y + \frac{3}{2}, R = 0$

Verification:

$$\begin{aligned} \text{Dividend} &= (\text{Divisor} \times \text{quotient}) + \text{Remainder} \\ &= (2y^2 - 6) \times (3y^3 - 5y + \frac{3}{2}) + 0 \\ &= 2y^2(3y^3 - 5y + \frac{3}{2}) - 6(3y^3 - 5y + \frac{3}{2}) \\ &= 6y^5 - 10y^3 + 3y^2 - 18y^3 + 30y - 9 \\ &= 6y^5 - 28y^3 + 3y^2 + 30y - 9 \end{aligned}$$

hence verified.

(iv) Dividend = $34x - 22x^3 - 12x^4 - 10x^2 - 75$

Divisor = $3x + 7$

Solution:

$$\begin{array}{r}
 - 4x^3 + 2x^2 - 8x + 30 \\
 3x+7 \overline{) } \\
 \underline{-12x^4 - 28x^3} \\
 6x^3 - 10x^2 + 34x - 75 \\
 \underline{6x^3 + 14x^2} \\
 -24x^2 + 34x - 75 \\
 \underline{-24x^2 - 56x} \\
 90x - 75 \\
 \underline{90x + 210} \\
 -285
 \end{array}$$

$\therefore Q = -4x^3 + 2x^2 - 8x + 30$

$R = -285$

Verification:

Dividend = Divisor $\times$ quotient + Remainder.

$= (3x+7)(-4x^3+2x^2-8x+30) + (-285)$

$= 3x(-4x^3+2x^2-8x+30) + 7(-4x^3+2x^2-8x+30) + (-285)$

$= -12x^4 + 6x^3 - 24x^2 + 90x - 28x^3 + 14x^2$

$- 56x + 210 - 285$

$= -12x^4 - 22x^3 - 10x^2 + 34x - 75 = \text{Dividend}$

(v) Dividend = $15y^4 - 16y^3 + 9y^2 - \frac{10}{3}y + 6$

Divisor = $3y - 2$

Sol:

$$\begin{array}{r}
 5y^3 - 2y^2 + \frac{5}{3}y \\
 \hline
 3y-2 \overline{) 15y^4 - 16y^3 + 9y^2 - \frac{10}{3}y + 6} \\
 \underline{15y^4 - 10y^3} \phantom{+ 9y^2 - \frac{10}{3}y + 6} \\
 -6y^3 + 9y^2 - \frac{10}{3}y + 6 \\
 \underline{-6y^3 + 4y^2} \phantom{- \frac{10}{3}y + 6} \\
 5y^2 - \frac{10}{3}y + 6 \\
 \underline{5y^2 - \frac{10}{3}y} \\
 6
 \end{array}$$

$\therefore Q = 5y^3 - 2y^2 + \frac{5}{3}y, \quad R = 6$

Verification:

Dividend = Divisor $\times$ quotient + Remainder

$= (3y - 2) \left(5y^3 - 2y^2 + \frac{5}{3}y \right) + 6$

$= 3y \left(5y^3 - 2y^2 + \frac{5}{3}y \right) - 2 \left(5y^3 - 2y^2 + \frac{5}{3}y \right) + 6$

$= 15y^4 - 6y^3 + 5y^2 - 10y^3 + 4y^2 - \frac{10}{3}y + 6$

$= 15y^4 - 16y^3 + 9y^2 - \frac{10}{3}y + 6$

$= \text{Dividend.}$

(vi) Dividend = $4y^3 + 8y^2 + 8y + 7$

Divisor = $2y^2 - y + 1$

Sol:

$$\begin{array}{r}
 2y^2 - y + 1 \overline{) 4y^3 + 8y^2 + 8y + 7} \\
 \underline{4y^3 - 2y^2 + 2y} \\
 10y^2 + 6y + 7 \\
 \underline{10y^2 - 5y + 5} \\
 11y + 2
 \end{array}$$

$\therefore Q = 2y + 5, R = 11y + 2$

Verify: Dividend = Divisor $\times$ Quotient + Remainder

$$= (2y^2 - y + 1)(2y + 5) + (11y + 2)$$

$$= 2y^2(2y + 5) - y(2y + 5) + 1(2y + 5) + 11y + 2$$

$$= 4y^3 + 10y^2 - 2y^2 - 5y + 2y + 5 + 11y + 2$$

$$= 4y^3 + 8y^2 + 8y + 7$$

$$= \text{Dividend.}$$

(vii) Dividend = $6y^5 + 4y^4 + 4y^3 + 7y^2 + 27y + 6$

Divisor = $2y^3 + 1$

Sol:

$$\begin{array}{r}
 3y^2 + 2y + 2 \\
 \hline
 2y^3 + 1 \overline{) 6y^5 + 4y^4 + 4y^3 + 7y^2 + 27y + 6} \\
 \underline{6y^5} \qquad \qquad \qquad \underline{+ 3y^2} \qquad \qquad \qquad . \\
 4y^4 + 4y^3 + 4y^2 + 27y + 6 \\
 \underline{4y^4} \qquad \qquad \qquad \underline{+ 2y} \qquad \qquad \qquad . \\
 4y^3 + 4y^2 + 25y + 6 \\
 \underline{4y^3} \qquad \qquad \qquad \underline{+ 2} \qquad \qquad \qquad . \\
 4y^2 + 25y + 4
 \end{array}$$

$$Q = 3y^2 + 2y + 2, \quad R = 4y^2 + 25y + 4$$

$$\therefore \text{Dividend} = \text{Divisor} \times \text{quotient} + \text{Remainder}$$

$$= (2y^3 + 1)(3y^2 + 2y + 2) + (4y^2 + 25y + 4)$$

$$= 2y^3(3y^2 + 2y + 2) + 1(3y^2 + 2y + 2) + (4y^2 + 25y + 4)$$

$$= 6y^5 + 4y^4 + 4y^3 + 3y^2 + 2y + 2 + 4y^2 + 25y + 4$$

$$= 6y^5 + 4y^4 + 4y^3 + 7y^2 + 27y + 6$$

$$= \text{Dividend}$$

Q 22 Divide $15y^4 + 16y^3 + \frac{10}{3}y - 9y^2 - 6$ by $3y - 2$.

Write down the coefficients of the terms in the quotient.

Sol:

$$\text{Dividend} = 15y^4 + 16y^3 + \frac{10}{3}y - 9y^2 - 6$$

$$\text{Standard form} = 15y^4 + 16y^3 - 9y^2 + \frac{10}{3}y - 6$$

$$\begin{array}{r}
 5y^3 + \frac{26}{3}y^2 + \frac{25}{9}y + \frac{80}{27} \\
 3y-2 \overline{) 15y^4 + 16y^3 - 9y^2 + \frac{10}{3}y - 6} \\
 \underline{15y^4 - 10y^3} \phantom{- 9y^2 + \frac{10}{3}y - 6} \\
 26y^3 - 9y^2 + \frac{10}{3}y - 6 \\
 \underline{26y^3 - \frac{52}{3}y^2} \phantom{+ \frac{10}{3}y - 6} \\
 \frac{25}{3}y^2 + \frac{10}{3}y - 6 \\
 \underline{\frac{25}{3}y^2 - \frac{50}{9}y} \\
 \frac{80}{9}y - 6 \\
 \underline{\frac{80}{9}y - \frac{160}{27}} \\
 -\frac{2}{27}
 \end{array}$$

$$\text{Quotient} = 5y^3 + \frac{26}{3}y^2 + \frac{25}{9}y + \frac{80}{27}$$

$$\text{Co-eff of } y^3 = 5, \text{ Co-eff of } y^2 = \frac{26}{3}$$

$$\text{Co-eff of } y = \frac{25}{9}, \text{ Constant term} = \frac{80}{27}$$

Q.23 Using division of polynomials state whether -

(i) $x+6$ is a factor of $x^2 - x - 42$

Sol:

$$\begin{array}{r|l} x-7 & x^2 - x - 42 \\ x+6 & x^2 + 6x \\ \hline & -7x - 42 \\ & -7x - 42 \\ \hline & 0 \end{array}$$

Since Remainder = 0

$\therefore$ yes $x+6$ is a factor of $x^2 - x - 42$.

(ii) $4x-1$ is a factor of $6x^2 - 13x + 12$

Sol:

$$\begin{array}{r|l} x-3 & 6x^2 - 13x + 12 \\ 4x-1 & 4x^2 - x \\ \hline & -12x + 12 \\ & -12x + 3 \\ \hline & -15 \end{array}$$

$\therefore$ Remainder $\neq 0$, No, it is not a factor.

(iii) $2y-5$ is a factor of $4y^4 - 10y^3 - 10y^2 + 30y - 15$

Sol:

$$\begin{array}{r}
 2y-5 \overline{) 4y^4 - 10y^3 - 10y^2 + 30y - 15} \\
 \underline{4y^4 - 10y^3} \\
 -10y^2 + 30y - 15 \\
 \underline{-10y^2 - 25y} \\
 55y - 15 \\
 \underline{55y - \frac{275}{2}} \\
 -\frac{195}{2}
 \end{array}$$

$\therefore$ Remainder $\neq 0$

Therefore, it is not a factor.

(iv) $3y^2+5$ is a factor of $6y^5 + 15y^4 + 16y^3 + 4y^2 + 10y - 35$

Sol:

$$\begin{array}{r}
 3y^2+5 \overline{) 6y^5 + 15y^4 + 16y^3 + 4y^2 + 10y - 35} \\
 \underline{6y^5 + 10y^3} \\
 15y^4 + 6y^3 + 4y^2 + 10y - 35 \\
 \underline{15y^4 + 25y^2} \\
 6y^3 - 21y^2 + 10y - 35 \\
 \underline{6y^3 + 10y} \\
 -21y^2 - 35 \\
 \underline{-21y^2 - 35} \\
 0
 \end{array}$$

∴ Yes, it is a factor.

(v) z^2+3 is a factor of z^5-9z

Sol:

$$\begin{array}{r}
 z^3-3z \\
 \hline
 z^2+3 \quad z^5+0z^4+0z^3+0z^2-9z \\
 \underline{z^5 \qquad +3z^3} \\
 0z^4-3z^3+0z^2-9z \\
 \underline{-3z^3 \qquad -9z} \\
 0
 \end{array}$$

∴ Yes, it is a factor of the polynomial.

(vi) $2x^2-x+3$ is a factor of $6x^5-x^4+4x^3-5x^2-x-15$

Sol:

$$\begin{array}{r}
 3x^3+x^2-2x-5 \\
 \hline
 2x^2-x+3 \quad 6x^5-x^4+4x^3-5x^2-x-15 \\
 \underline{6x^5-3x^4+9x^3} \\
 - \quad + \quad - \\
 2x^4-5x^3-5x^2-x-15 \\
 \underline{2x^4-x^3+3x^2} \\
 -4x^3-8x^2-x-15 \\
 \underline{-4x^3+2x^2+6x} \\
 + \quad + \quad + \\
 -10x^2+5x-15 \\
 \underline{-10x^2+5x-15} \\
 0
 \end{array}$$

∴ Yes, it is a factor of polynomial.

Q.24 Find the value of a , if $x+2$ is a factor of $4x^4 + 2x^3 - 3x^2 + 8x + 5a$.

Solution By long division method.

$$\begin{array}{r}
 4x^3 - 6x^2 + 9x - 10 \\
 \hline
 x+2 \overline{) 4x^4 + 2x^3 - 3x^2 + 8x + 5a} \\
 \underline{4x^4 + 8x^3} \\
 -6x^3 - 3x^2 + 8x + 5a \\
 \underline{-6x^3 - 12x^2} \\
 9x^2 + 8x + 5a \\
 \underline{9x^2 + 18x} \\
 -10x + 5a \\
 \underline{-10x - 20} \\
 5a + 20
 \end{array}$$

∴ $x+2$ is a factor of polynomial

therefore Remainder = 0

$$5a + 20 = 0$$

$$5a = -20$$

$$a = \frac{-20}{5}$$

$$a = -4$$

Q.25 What must be added to $x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$.

Sol:

$$\begin{array}{r}
 \begin{array}{l} x^2 + 2x - 3 \end{array} \overline{) \begin{array}{l} x^4 + 2x^3 - 2x^2 + x - 1 \\ x^4 + 2x^3 - 3x^2 \\ \hline + x^2 + x - 1 \\ \underline{x^2 + 2x - 3} \\ - x + 2 \end{array} \\
 + 2
 \end{array}$$

No. should be added = $-(-x + 2)$
 $= x - 2$