

Algebra Assignment

Q1) $(3x^3 - 2x^2 + 7) \div (x + 2)$ (Long division)

$$\begin{array}{r} \textcircled{3x^2 - 8x} \rightarrow \text{Quotient} \\ x+2 \overline{) 3x^3 - 2x^2 + 7} \\ \underline{3x^3 + 6x^2} \\ -8x^2 + 7 \\ \underline{-8x^2 - 16x} \\ 16x + 7 \rightarrow \text{Remainder} \end{array}$$

$$\therefore \text{Quotient} = 3x^2 - 8x$$

$$\text{Remainder} = 16x + 7$$

Q2) $(4x^5 - 10x^4 - 9x^2 + 2) \div (x - 3)$. (Synthetic division)

3		4	-10	0	-9	0	2
		↓	12	6	18	27	81
		4	2	6	9	27	83

$\therefore$ Remainder = 83

Quotient = $4x^4 + 2x^3 + 6x^2 + 9x + 27$.

Q3) $(x^3 + kx^2 - 2x - 7) \div (x - 2) = 17$.

$$\begin{array}{r|rrrr} \therefore & 2 & 1 & k & -2 & -7 \\ & & \downarrow & 2 & (2k+4) & (4k+4) \\ & & 1 & k+2 & 2k+2 & (4k-3) \rightarrow R \end{array}$$

$$\therefore 4k - 3 = 17$$

$$\therefore 4k = 20$$

$$\therefore \boxed{k = 5}$$

$\therefore$ The eq. is $x^3 + 5x^2 - 2x - 7$.

Now, solving $(x^3 + 5x^2 - 2x - 7) \div (x + 1)$,

$$\begin{array}{r|rrrr} -1 & 1 & 5 & -2 & -7 \\ & \downarrow & -1 & -4 & 6 \\ & 1 & 4 & -6 & \boxed{-1} \rightarrow R \end{array}$$

$\therefore$ Remainder = 1.

Q4) $P(x) = 2x^4 - 3x^3 + 5x^2 - 7$.

Substituting $x = 2$,

$$\begin{aligned} P(2) &= 2(2)^4 - 3(2)^3 + 5(2)^2 - 7 \\ &= 32 - 24 + 20 - 7 \\ &= 21 \end{aligned}$$

$$\therefore P(2) = 21$$

Q5) $(x^{17} - 3x^{11} + 5) \div (x+1)$

$$\begin{array}{r}
 x^{16} - x^{15} + x^{14} - x^{13} + x^{12} - x^{11} - 2x^{10} \\
 x+1 \overline{) x^{17} - 3x^{11} + 5} \\
 \underline{- x^{17} + x^{16}} \\
 -x^{16} - 3x^{11} + 5 \\
 \underline{- x^{16} - x^{15} - 3x^{11} + 5} \\
 x^{15} - 3x^{11} + 5 \\
 \underline{- x^{15} + x^{14}} \\
 -x^{14} - 3x^{11} + 5 \\
 \underline{- x^{14} - x^{13}} \\
 x^{13} - 3x^{11} + 5 \\
 \underline{x^{13} + 3x^{12}} \\
 -x^{12} - 3x^{11} + 5 \\
 \underline{- x^{12} - x^{11}} \\
 -2x^{11} + 5 \\
 \underline{- 2x^{10} - 2x^{10}} \\
 2x^{10} + 5
 \end{array}$$

$\therefore \text{Remainder} = 2x^{10} + 5$

Q6)

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

As remainder = 0,
 $(x+2)$ is a factor
of
 $(3x^4 + 4x^3 - 3x^2 - 3x - 10)$

17) Let width be x .

∴ According to question,

$$\text{length} = 2x$$

$$\text{height} = (x+4)$$

$$\text{Now, Volume} = 720 \text{ cm}^3$$

$$\therefore l \times w \times h = 720 \text{ cm}^3$$

$$\therefore (2x)(x)(x+4) = 720 \text{ cm}^3$$

$$\therefore 2x^2(x+4) = 720$$

$$\therefore 2x^3 + 8x^2 = 720$$

$$\therefore x^3 + 4 = 360$$

$$\therefore x^3 = 356$$

$$\therefore x = 7.087 \text{ cm}$$

$$\therefore \text{Width} = 7.087 \text{ cm}$$

$$\therefore \text{Length} = 14.174 \text{ cm}$$

$$\therefore \text{Height} = 11.087 \text{ cm}$$