

1)

$$f(x) = 2x^3 - 7x^2 - 17x + 10$$

$$f(1) = -12$$

$$f(2) = -36$$

$$f(-1) = 18$$

$$f(-2) = 0$$

$f(-2) = 0 \therefore (x+2)$ is a factor

$$\begin{array}{r}
 2x^2 - 11x + 5 \\
 x+2 \overline{) 2x^3 - 7x^2 - 17x + 10} \\
 \underline{2x^3 + 4x^2} \\
 -11x^2 - 17x \\
 \underline{-11x^2 - 22x} \\
 5x + 10 \\
 \underline{5x + 10} \\
 0
 \end{array}$$

$$(x+2)(2x^2 - 11x + 5)$$

$$(x+2)(2x-1)(x-5)$$

2)

$$g(x) = 4x^3 - 8x^2 - 35x + 75$$

$$g(-3) = 4(-3)^3 - 8(-3)^2 - 35(-3) + 75$$

$$g(-3) = 0 \quad \therefore (x+3) \text{ is a factor of } g(x)$$

b)

$$\begin{array}{r}
 4x^2 - 20x + 25 \\
 x+3 \overline{) 4x^3 - 8x^2 - 35x + 75} \\
 \underline{4x^3 + 12x^2} \\
 -20x^2 - 35x \\
 \underline{-20x^2 - 60x} \\
 25x + 75 \\
 \underline{25x + 75} \\
 0
 \end{array}$$

$$(x+3)(4x^2 - 20x + 25)$$

$$(x+3)(2x-5)(2x-5)$$

$$(x+3)(2x-5)^2$$

$$\underline{\underline{a=2}} \quad \underline{\underline{b=-5}}$$

3)

$$f(x) = x^3 + 6x^2 + px + q$$

$$f(4) = 0$$

$$0 = (4)^3 + 6(4)^2 + 4p + q$$

$$0 = 160 + 4p + q \leftarrow$$

$$f(-5) = 36$$

$$36 = (-5)^3 + 6(-5)^2 - 5p + q$$

$$36 = 25 - 5p + q$$

$$11 = -5p + q$$

$$(11 + 5p) = q$$

$$0 = 160 + 4p + 11 + 5p$$

$$0 = 171 + 9p$$

$$-171 = 9p$$

$$\underline{\underline{p = -19}}$$

$$q = 11 + 5(-19)$$

$$\underline{\underline{q = -84}}$$

b) $f(4) = 0$ so $(x-4)$ is a factor

$$\begin{array}{r}
 x^2 + 10x + 21 \\
 x-4 \overline{) x^3 + 6x^2 - 19x - 84} \\
 \underline{x^3 - 4x^2} \\
 10x^2 - 19x \\
 \underline{10x^2 - 40x} \\
 21x - 84 \\
 \underline{21x - 84} \\
 0
 \end{array}$$

$$(x-4)(x^2 + 10x + 21)$$

$$\underline{\underline{(x-4)(x+3)(x+7)}}$$

4/

$$f(x) = 2x^3 - x^2 - 13x + 14$$

$$f(2) = 2(2)^3 - (2)^2 - 13(2) + 14 \\ = 0$$

$f(2) = 0 \therefore (x - 2)$ is a factor of $f(x)$

b/

$$\begin{array}{r} 2x^2 + 3x - 7 \\ x - 2 \overline{) 2x^3 - x^2 - 13x + 14} \\ \underline{2x^3 - 4x^2} \\ 3x^2 - 13x \\ \underline{3x^2 - 6x} \\ -7x + 14 \\ \underline{-7x + 14} \\ 0 \end{array}$$

$$(x - 2)(2x^2 + 3x - 7) \\ \cancel{(x - 2)(2x)} \cancel{(x)}$$

$$a = 2 \quad b = 3 \quad c = -7$$

$$x = \frac{- (3) \pm \sqrt{(3)^2 - 4(2)(-7)}}{2(2)}$$

$$\underline{\underline{x = 2}}$$

$$\underline{\underline{x = 1.27}}$$

$$\underline{\underline{x = -2.77}}$$

5)

$$f(x) = x^3 + kx - 2$$

$$a) \quad f(2) = 0$$

$$0 = (2)^3 + 2k - 2$$

$$0 = 6 + 2k$$

$$\underline{\underline{k = -3}}$$

$$b) \quad f(x) = x^3 - 3x - 2$$

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

$$\begin{aligned} &(x-2)(x^2 + 2x + 1) \\ &(x-2)(x+1)^2 \end{aligned}$$

$$\underline{\underline{x = 2}}$$

$$\underline{\underline{x = -1}}$$

5)

$$f(x) = x^3 + 6x^2 + 4x - 15$$

$$f(-3) = (-3)^3 + 6(-3)^2 + 4(-3) - 15 = 0$$

$\therefore (x+3)$ is a factor

$x = -3$ is a solution

6)

$$\begin{array}{r}
 x^2 + 3x - 5 \\
 x + 3 \overline{) x^3 + 6x^2 + 4x - 15} \\
 \underline{x^3 + 3x^2} \\
 3x^2 + 4x \\
 \underline{3x^2 + 9x} \\
 -5x - 15 \\
 \underline{-5x - 15} \\
 0
 \end{array}$$

$$(x + 3)(x^2 + 3x - 5)$$

$$a = 1 \quad b = 3 \quad c = -5$$

$$x = \frac{- (3) \pm \sqrt{(3)^2 - 4(-5)}}{2}$$

$$x = \underline{\underline{1.19}} \quad x = \underline{\underline{-4.19}}$$