

Question 1

$$\begin{aligned}\frac{4x^4 + 5x^2 - 7x}{x} &= \frac{x(4x^3 + 5x - 7)}{x} \\ &= 4x^3 + 5x - 7\end{aligned}\tag{1a}$$

$$\begin{aligned}\frac{7x^5 - 5x^5 + 9x^3 + x^2}{x} &= \frac{x(2x^4 + 9x^2 + x)}{x} \\ &= 2x^4 + 9x^2 + x\end{aligned}\tag{1b}$$

$$\begin{aligned}\frac{-x^4 + 4x^2 + 6}{x} &= \frac{x(4x - x^3) + 6}{x} \\ &= \frac{x(4x - x^3)}{x} + \frac{6}{x} \\ &= 4x - x^3 + \frac{6}{x}\end{aligned}\tag{1c}$$

$$\begin{aligned}\frac{7x^5 - x^3 - 4}{x} &= \frac{x(7x^4 - x^2) - 4}{x} \\ &= \frac{x(7x^4 - x^2)}{x} - \frac{4}{x} \\ &= 7x^4 - x^2 - \frac{4}{x}\end{aligned}\tag{1d}$$

$$\begin{aligned}\frac{8x^4 - 4x^3 + 6x}{2x} &= \frac{2x(4x^3 - 2x^2 + 3)}{2x} \\ &= 4x^3 - 2x^2 + 3\end{aligned}\tag{1e}$$

$$\begin{aligned}\frac{9x^2 - 12x^3 - 3x}{3x} &= \frac{3x(3x - 4x^2 - 1)}{3x} \\ &= -4x^2 + 3x - 1\end{aligned}\tag{1f}$$

$$\begin{aligned}\frac{7x^3 - x^4 - 2}{5x} &= \frac{x(7x^2 - x^3)}{x(5)} - \frac{2}{5x} \\ &= -\frac{1}{5}x^3 + \frac{7}{5}x^2 - \frac{2}{5x}\end{aligned}\tag{1g}$$

$$\begin{aligned}\frac{-4x^2 + 6x^4 - 2x}{-2x} &= \frac{-2x(2x - 3x^3 + 1)}{-2x} \\ &= -3x^3 + 2x + 1\end{aligned}\tag{1h}$$

$$\begin{aligned}\frac{-x^8 + 9x^4 - 4x^3 + 6}{-2x} &= \frac{-x(x^7 - 9x^3 + 4x^2)}{-x(2)} + \frac{-2(-3)}{-2x} \\ &= \frac{1}{2}x^7 - \frac{9}{2}x^3 + 2x^2 - \frac{3}{x}\end{aligned}\tag{1i}$$

$$\begin{aligned}\frac{-9x^9 - 6x^6 + 4x^4 - 2}{-3x} &= \frac{-x(9x^8 + 6x^5 - 4x^3)}{-x(3)} - \frac{2}{-3x} \\ &= 3x^8 + 2x^5 - \frac{4}{3}x^3 + \frac{2}{3x}\end{aligned}\tag{1j}$$

Question 2

$$\frac{(x+3)(x-2)}{(x-2)} = x+3\tag{2a}$$

$$\frac{(x+4)(3x-1)}{(3x-1)} = x+4\tag{2b}$$

$$\frac{(x+3)^2}{(x+3)} = x+3\tag{2c}$$

$$\begin{aligned}\frac{x^2 + 10x + 21}{(x+3)} &= \frac{(x+3)(x+7)}{(x+3)} \\ &= x+7\end{aligned}\tag{2d}$$

$$\begin{aligned}\frac{x^2 + 9x + 20}{(x+4)} &= \frac{(x+4)(x+5)}{(x+4)} \\ &= x+5\end{aligned}\tag{2e}$$

$$\begin{aligned}\frac{x^2 + x - 12}{(x-3)} &= \frac{(x-3)(x+4)}{(x-3)} \\ &= x+4\end{aligned}\tag{2f}$$

$$\begin{aligned}\frac{x^2 + x - 20}{x^2 + 2x - 15} &= \frac{(x-4)(x+5)}{(x-3)(x+5)} \\ &= \frac{x-4}{x-3}\end{aligned}\tag{2g}$$

$$\begin{aligned}\frac{x^2 + 3x + 2}{x^2 + 5x + 4} &= \frac{(x+1)(x+2)}{(x+1)(x+4)} \\ &= \frac{x+2}{x+4}\end{aligned}\tag{2h}$$

$$\begin{aligned}\frac{x^2 + x - 12}{x^2 - 9x + 18} &= \frac{(x - 3)(x + 4)}{(x - 3)(x - 6)} \\ &= \frac{x + 4}{x - 6}\end{aligned}\tag{2i}$$

$$\begin{aligned}\frac{2x^2 + 7x + 6}{(x - 5)(x + 2)} &= \frac{(2x + 3)(x + 2)}{(x - 5)(x + 2)} \\ &= \frac{2x + 3}{x - 5}\end{aligned}\tag{2j}$$

$$\begin{aligned}\frac{2x^2 + 9x - 18}{(x + 6)(x + 1)} &= \frac{(2x - 3)(x + 6)}{(x + 6)(x + 1)} \\ &= \frac{2x - 3}{x + 1}\end{aligned}\tag{2k}$$

$$\begin{aligned}\frac{3x^2 - 7x + 2}{(3x - 1)(x + 2)} &= \frac{(3x - 1)(x - 2)}{(3x - 1)(x + 2)} \\ &= \frac{x - 2}{x + 2}\end{aligned}\tag{2l}$$

$$\begin{aligned}\frac{2x^2 + 3x + 1}{x^2 - x - 2} &= \frac{(2x + 1)(x + 1)}{(x - 2)(x + 1)} \\ &= \frac{2x + 1}{x - 2}\end{aligned}\tag{2m}$$

$$\begin{aligned}\frac{x^2 + 6x + 8}{3x^2 + 7x + 2} &= \frac{(x + 4)(x + 2)}{(3x + 1)(x + 2)} \\ &= \frac{x + 4}{3x + 1}\end{aligned}\tag{2n}$$

$$\begin{aligned}\frac{2x^2 - 5x - 3}{2x^2 - 9x + 9} &= \frac{(2x + 1)(x - 3)}{(2x - 3)(x - 3)} \\ &= \frac{2x + 1}{2x - 3}\end{aligned}\tag{2o}$$

Question 3

Find a , b , and c :

$$\frac{6x^3 + 3x^2 - 84x}{6x^2 - 33x + 42} = \frac{ax(x + b)}{x + c}\tag{3}$$

$$\begin{aligned}
\frac{6x^3 + 3x^2 - 84x}{6x^2 - 33x + 42} &= \frac{3x(2x^2 + x - 28)}{3(2x^2 - 11x + 14)} \\
&= \frac{x(2x - 7)(x + 4)}{(2x - 7)(x - 2)} \\
&= \frac{x(x + 4)}{x - 2}
\end{aligned}$$

$$\therefore a = 1, b = 4, c = -2$$