Pure Book 1, Exercise 7A

Question 1 Simplify these fractions:

$$\frac{4x^4+5x^2-7x}{x} = \frac{x(4x^3+5x-7)}{x} = 4x^3 + 5x - 7 \qquad \text{(a)}$$

$$\frac{7x^5-5x^5+9x^3+x^2}{x} = \frac{x(2x^4+9x^2+x)}{x} = 2x^4 + 9x^2 + x \qquad \text{(b)}$$

$$\frac{-x^4+4x^2+6}{x} = \frac{x(4x-x^3)+6}{x} = \frac{x(4x-x^3)}{x} + \frac{6}{x} = 4x - x^3 + \frac{6}{x} \qquad \text{(c)}$$

$$\frac{7x^5-x^3-4}{x} = \frac{x(7x^4-x^2)-4}{x} = \frac{x(7x^4-x^2)}{x} - \frac{4}{x} = 7x^4 - x^2 - \frac{4}{x} \qquad \text{(d)}$$

$$\frac{8x^4-4x^3+6x}{2x} = \frac{2x(4x^3-2x^2+3)}{2x} = 4x^3 - 2x^2 + 3 \qquad \text{(e)}$$

$$\frac{9x^2-12x^3-3x}{3x} = \frac{3x(3x-4x^2-1)}{3x} = -4x^2 + 3x - 1 \qquad \text{(f)}$$

$$\frac{7x^3-x^4-2}{5x} = \frac{x(7x^2-x^3)}{x(5)} - \frac{2}{5x} = -\frac{1}{5}x^3 + \frac{7}{5}x^2 - \frac{2}{5x} \qquad \text{(g)}$$

$$\frac{-4x^2+6x^4-2x}{-2x} = \frac{-2x(2x-3x^3+1)}{-2x} = -3x^3 + 2x + 1 \qquad \text{(h)}$$

$$\frac{-x^8+9x^4-4x^3+6}{-2x} = \frac{-x(x^7-9x^3+4x^2)}{-x(2)} + \frac{-2(-3)}{-2x} = \frac{1}{2}x^7 - \frac{9}{2}x^3 + 2x^2 - \frac{3}{x} \qquad \text{(i)}$$

$$\frac{-9x^9-6x^6+4x^4-2}{-3x} = \frac{-x(9x^8+6x^5-4x^3)}{-x(3)} - \frac{2}{-3x} = 3x^8 + 2x^5 - \frac{4}{3}x^3 + \frac{2}{3x} \qquad \text{(j)}$$

Question 2 Simplify these fractions as far as possible:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Question 3 $\frac{6x^3+3x^2-84x}{6x^2-33x+42} = \frac{ax(x+b)}{x+c}$, where a, b, and c are constants. Work out the values of a, b, and c.

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

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