

$$1) \quad \frac{x+5}{(x+2)(x+3)} = \frac{A}{x+2} + \frac{B}{x+3}$$

$$x+5 = A(x+3) + B(x+2)$$

$$\text{Let } x = -3$$

$$2 = B(-1)$$

$$\underline{\underline{B = -2}}$$

$$\text{Let } x = -2$$

$$\underline{\underline{3 = A}}$$

$$\frac{3}{x+2} - \frac{2}{x+3}$$

$$2) \quad \frac{9x-5}{2(2x-1)(x-1)} = \frac{A}{2x-1} + \frac{B}{x-1}$$

$$9x-5 = 2A(x-1) + 2B(2x-1)$$

$$\text{Let } x = 1$$

$$4 = 2B$$

$$B = 2$$

$$\text{Let } x = \frac{1}{2}$$

$$-0.5 = -A$$

$$A = 0.5$$

$$\frac{0.5}{2x-1} + \frac{2}{x-1}$$

$$\left[ \frac{1}{2(2x-1)} + \frac{2}{x-1} \right]$$

$$3) \quad \frac{5x-13}{(x-1)(x-3)^2} = \frac{A}{x-1} + \frac{B}{x-3} + \frac{C}{(x-3)^2}$$

$$5x-13 = A(x-3)^2 + B(x-1)(x-3) + C(x-1)$$

Let  $x=3$

$$2 = 2C$$

$$C = 1$$

Let  $x=1$

$$-8 = 4A$$

$$A = -2$$

Let  $x=0$

$$-13 = 9A + 3B - C$$

$$-13 = -18 + 3B - 1$$

$$6 = 3B$$

$$B = 2$$

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

4/

$$\frac{5x^2 - 12x - 1}{(x+3)(x-1)^2} = \frac{A}{x+3} + \frac{B}{x-1} + \frac{C}{(x-1)^2}$$

$$5x^2 - 12x - 1 = A(x-1)^2 + B(x+3)(x-1) + C(x+3)$$

Let  $x = 1$ 

$$-8 = 4C$$

$$C = -2$$

Let  $x = -3$ 

$$80 = 16A$$

$$A = 5$$

Let  $x = 0$ 

$$-1 = A - 3B + 3C$$

$$-1 = 5 - 3B - 6$$

$$0 = -3B$$

$$B = 0$$

$$\frac{5}{x+3} - \frac{2}{(x-1)^2}$$

5/

$$\frac{6x^2 - x + 1}{(3x-1)(x+1)} = A + \frac{B}{3x-1} + \frac{C}{x+1}$$

$$6x^2 - x + 1 = A(3x-1)(x+1) + B(x+1) + C(3x-1)$$

Let  $x = -1$

$$8 = -4C$$

$$C = -2$$

Let  $x = \frac{1}{3}$

$$\frac{4}{3} = \frac{4}{3}B$$

$$B = 1$$

Let  $x = 0$

$$1 = -A + B - C$$

$$1 = -A + 1 + 2$$

$$1 = -A + 3$$

$$-2 = -A$$

$$A = 2$$

$$2 + \frac{1}{3x-1} - \frac{2}{x+1}$$

6

$$\frac{2x^3 + 7x^2 + 8x + 2}{(x+1)(x+2)} = Ax + B + \frac{C}{x+1} + \frac{D}{x+2}$$

$$2x^3 + 7x^2 + 8x + 2 = Ax(x+1)(x+2) + B(x+1)(x+2) + C(x+2) + D(x+1)$$

Let  $x = -1$

$$-1 = C$$

Let  $x = -2$

$$-2 = -D$$

$$D = 2$$

Let  $x = 0$

$$2 = 2B + 2C + D$$

$$2 = 2B - 2 + 2$$

$$B = 1$$

Let  $x = 1$

$$19 = 6A + 6B + 3C + 2D$$

$$19 = 6A + 6 - 3 + 4$$

$$19 = 6A + 7$$

$$12 = 6A$$

$$A = 2$$

$$2x + 1 - \frac{1}{x+1} + \frac{2}{x+2}$$

$$7) \quad \frac{6(x^2 + 4x + 1)}{(2x+3)(3x-1)} = A + \frac{B}{2x+3} + \frac{C}{3x-1}$$

$$6(x^2 + 4x + 1) = A(2x+3)(3x-1) + B(3x-1) + C(2x+3)$$

$$\text{Let } x = -\frac{3}{2}$$

$$-\frac{33}{2} = -\frac{11}{2} B$$

$$B = 3$$

$$\text{Let } x = \frac{1}{3}$$

$$\frac{44}{3} = \frac{11}{3} C$$

$$C = 4$$

$$\text{Let } x = 0$$

$$6 = -3A - B + 3C$$

$$6 = -3A - 3 + 12$$

$$-3 = -3A$$

$$A = 1$$

$$1 + \frac{3}{2x+3} + \frac{4}{3x-1}$$