

ONTARIO BASHI AWELE VICTORY

19/MHS01/354.

$$\int \frac{11-3x}{x^2+2x-3} dx$$

soln

$$\text{let } x^2+2x-3=0$$

$$\Rightarrow (x+3)(x-1)$$

$$\int \frac{11-3x}{(x+3)(x-1)} = \frac{A}{x+3} + \frac{B}{x-1}$$

$$\frac{11-3x}{(x+3)(x-1)} = \frac{A(x-1) + B(x+3)}{(x+3)(x-1)}$$

$$\text{let } x-1=0$$

$$x=1$$

$$11-3(1) = A(1-1) + B(1+3)$$

$$11-3 = 4B$$

$$8 = 4B$$

$$B = \frac{8}{4}$$

$$B = 2$$

$$\text{Let } x+3=0$$

$$x=-3$$

$$11-3(-3) = A(-3-1) + B(-3+3)$$

$$11+9 = -4A$$

$$20 = -4A$$

$$A = \frac{20}{-4}$$

$$-4$$

$$A = -5$$

$$\frac{11-3x}{(x+3)(x-1)} = \frac{-5}{x+3} + \frac{2}{x-1}$$

$$\int \frac{11-3x}{x^2+2x-3} dx = \int \left(\frac{-5}{x+3} + \frac{2}{x-1} \right) dx$$

$$= \int \frac{-5}{x+3} dx + \int \frac{2}{x-1} dx$$

$$\Rightarrow -5 \ln(x+3) + 2 \ln(x-1) + C$$

$$\textcircled{2} \int \frac{4x-16}{x^2-2x-3} dx$$

soln

$$\text{let } x^2 - 2x - 3 = 0$$

$$\Rightarrow (x-3)(x+1)$$

$$\frac{4x-16}{(x-3)(x+1)} = \frac{A}{x-3} + \frac{B}{x+1}$$

$$\frac{4x-16}{(x-3)(x+1)} = \frac{A(x+1) + B(x-3)}{(x-3)(x+1)}$$

$$\text{let } x+1=0$$

$$x = -1$$

$$4(-1) - 16 = A(-1+1) + B(-1-3)$$

$$-4 - 16 = -4B$$

$$\Rightarrow -20 = -4B$$

$$B = \frac{-20}{-4}$$

$$B = 5$$

$$\text{let } x-3=0$$

$$x = 3$$

$$4(3) - 16 = A(3+1) + B(3-3)$$

$$\Rightarrow 12 - 16 = 4A$$

$$-4 = 4A$$

$$A = \frac{-4}{4}$$

$$A = -1$$

$$\frac{4x-16}{(x-3)(x+1)} = \frac{-1}{x-3} + \frac{5}{x+1}$$

$$\int \frac{4x-16}{x^2-2x-3} dx = \int \left(\frac{1}{x-3} + \frac{5}{x+1} \right) dx$$

$$= \int \frac{1}{x-3} dx + \int \frac{5}{x+1} dx$$

$$= \ln|x-3| + 5 \ln|x+1| + C$$

$$5) \int \frac{2x^2-9x-35}{(x+1)(x+2)(x+3)} dx$$

soln

$$2x^2-9x-35 = \frac{A}{x+1} + \frac{B}{x+2} + \frac{C}{x+3}$$

$$2x^2-9x-35 \equiv \frac{A(x+2)(x+3) + B(x+1)(x+3) + C(x+1)(x+2)}{(x+1)(x+2)(x+3)}$$

$$\text{let } x+1=0$$

$$x = -1$$

Substitute -1 for x.

$$2(-1)^2 - 9(-1) - 35 \equiv A(-1-2)(-1+3) + B(0) + C(0)$$

$$2 + 9 - 35 \equiv A(-3)(2) + 0 + 0$$

$$11 - 35 \equiv A(-6)$$

$$-24 = -6A$$

$$A = \frac{-24}{-6}$$

$$A = 4$$

$$A = 4$$

$$\text{let } x-2=0$$

$$x = 2$$

Substitute 2 for x

$$2(2)^2 - 9(2) - 35 \equiv A(0) + B(2+1)(2+3) + C(0)$$

$$8 - 18 - 35 = 0 + B(3)(5) + 0$$

$$45 = 15B$$

$$B \Rightarrow 45/15 = 3$$

$$\text{let } x+3=0$$

$$x = -3$$

Substitute -3 for x .

$$2(-3)^2 - 9(-3) - 35 \equiv A(0) + B(0) + C(-3+1)(-3-2)$$

$$18 + 27 - 35 \equiv 0 + 0 + C(-2)(-5)$$

$$45 - 35 \equiv 10C$$

$$10 \equiv 10C$$

$$C = \frac{10}{10}$$

$$C = 1$$

$$\frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} = \frac{4}{x+1} + \frac{3}{x-2} + \frac{1}{x+3}$$

$$\int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} dx = \int \left(\frac{4}{x+1} + \frac{3}{x-2} + \frac{1}{x+3} \right) dx$$

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

$$= 4 \ln|x+1| + 3 \ln|x-2| + \ln|x+3| + C$$