

Answers

1  $\int \frac{11-3x}{x^2+2x-3} dx = \int \frac{A}{x+3} + \frac{B}{x-1}$

$\frac{11-3x}{x^2+2x-3} = \frac{A}{x+3} + \frac{B}{x-1}$

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

let  $x=1$  to find B

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

$11-3 = 4B$

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

$B = 2$

let  $x=3$  to find A

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

$11+9 = -4A$

$20 = -4A$

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

$A = -5$

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

$u = x+3 \quad v = x-1$

$\frac{du}{dx} = 1 \quad \frac{dv}{dx} = 1$

$du = dx \quad dv = dx$

$\int \frac{-5du}{u} + \int \frac{2dv}{v}$

$-5 \ln(u) + 2 \ln(v)$

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

2  $\int \frac{20x^2-9x-35}{(x+1)(x-2)(x+3)} dx = \int \frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{x+3}$

$20x^2-9x-35 = A(x-2)(x+3) + B(x+1)(x-2) + C(x+1)(x+3)$

to find A let  $x = -1$

$2(-1)^2 - 9(-1) - 35 = A(-1-2)(-1+3) + B(-1-2)(-1+3) + C(-1+1)(-1+3)$

$2+9-35 = A(-3)(2) + 0 + 0$

$-24 = -6A$

$A = 4$

to find B let  $x = 2$

$2(2)^2 - 9(2) - 35 = A(2-2)(2+3) + B(2+1)(2-2) + C(2+1)(2-2)$

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

$-45 = 15B$

$B = -3$

to find C let  $x = -3$

$2(-3)^2 - 9(-3) - 35 = A(-3-2)(-3+3) + B(-3+1)(-3-2) + C(-3+1)(-3-2)$

$2(9) + 27 - 35 = 0 + 0 + C(-2)(-5)$

$10 = 10C$

$C = 1$

$\int \frac{20x^2-9x-35}{(x+1)(x+2)(x+3)} dx = \int \frac{4}{x+1} + \frac{-3}{x-2} + \frac{1}{x+3} dx$

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

continuation from no. 2

$$r = x + 3$$

$$v = x + 1 \quad \frac{dv}{dx} = 1$$

$$w = x - 2 \quad \frac{dw}{dx} = 1$$

$$u = dx \quad \frac{du}{dx} = dx$$

$$\int \frac{4dx}{4} + \int \frac{-3dx}{4} + \int \frac{dx}{4}$$

$$4 \ln(x) - 3 \ln(x) + \ln(x)$$

$$\int \frac{1}{x^2 + 121} dx = \int \frac{1}{x^2 + 11^2}$$

$$x = 11 \tan \theta$$

$$\frac{dx}{dt} = 11 \sec^2 \theta$$

$$dx = 11 \sec^2 \theta d\theta$$

$$x^2 + 121 = 121 + 11^2 \tan^2 \theta = 11^2 (1 + \tan^2 \theta)$$

$$11 \tan^2 \theta = \sec^2 \theta = 11^2 \sec^2 \theta$$

$$\int \frac{1}{11} d\theta$$

$$\frac{1}{11} [\theta]$$

$$= \frac{1}{11} \tan^{-1} \frac{x}{11}$$