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Matriculation Number: 19/MHS01/089

Course: MAT 102

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

let $g(x) = x^2 + 2x - 3$

$\frac{dg}{dx} = 2x + 2$

$\frac{dx}{dg} = \frac{1}{2x+2}$

$\int \frac{11-3x}{g(x)} \times \frac{d}{dg} = \int \frac{11-3x}{g(x)} \times \frac{1}{2x+2}$

$\int \frac{11-3x}{g(x)} \times \frac{d}{dg} = \frac{-3}{2} \int \frac{11-3x}{g(x)}$

Recall $g(x) = x^2 + 2x - 3$

$\therefore \frac{-3}{2} \int \frac{11-3x}{g(x)} = \frac{-3}{2} \int \frac{11-3x}{x^2+2x-3}$

$\frac{-3}{2} \int \frac{11-3x}{x^2+2x-3} = \frac{-3}{2} (\ln|x^2+3x-3|) + C$

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

let $g(x) = x^2 - 2x$

$\frac{dg}{dx} = 2x - 2$

$\frac{dx}{dg} = \frac{1}{2x-2}$

$$\int \frac{2x^2 - 9x - 35}{g(x)} \times \frac{1}{3x^2 - 8x + 1}$$

$$\frac{2-9}{3-8} \int \frac{2x^2 - 9x - 35}{g(x)}$$

$$\frac{77}{75} \int \frac{2x^2 - 9x - 35}{g(x)}$$

$$\frac{7}{5} \left(\ln |(x+1)(x-2)(x-3)| \right) + C$$

$$\int \frac{4x-16}{g(x)} \times dx$$

$$\int \frac{4x-16}{g(x)} \times \frac{1}{2x-2}$$

$$2 \int \frac{4x-16}{g(x)}$$

Recall $g(x) = x^2 - 2$

$$3 \left(\ln |x^2 - 2| \right) + C$$

(3)

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

$$g(x) = (x+1)(x-1)(x+3)$$

$$g(x) = (x+1)(x^2 - 5x + 6)$$

$$\frac{dg}{dx} = U \frac{du}{dx} + V \frac{dv}{dx}$$

$$\frac{dg}{dx} = (x+1)(2x-5) + (x^2 - 5x + 6)(1)$$

$$\frac{dg}{dx} = 2x^2 - 3x - 5 + x^2 - 5x + 6$$

$$\frac{dg}{dx} = 3x^2 - 8x + 1$$

$$\int \frac{2x^2 - 9x - 35}{3x^2 - 8x + 1} = \int \frac{2x^2 - 9x - 35}{g(x)} \times \frac{dx}{dg}$$