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DEPARTMENT: COMPUTER ENGINEERING

MATRIC NO: 19/Eng02/011

SERIAL NO: 144

COURSE: MAT 104

### ASSIGNMENT

Integrate the following with respect to their variable.

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

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

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

Let  $x=1$

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

$$11-3 = 4A$$

$$4A = 8$$

$$A = 2$$

Let  $x=-3$

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

$$11+9 = -4B$$

$$20 = -4B$$

$$B = -5$$

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

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

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

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

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

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

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

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

$$-24 = -6A$$

$$A = 4$$

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

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

$$-45 = 15B$$

$$B = -3$$

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

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

$$10 = 10C$$

$$C = 1$$

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

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

$$= 4 \log_e(x+1) - 3 \log_e(x-2) + \log_e(x+3) + C$$

$$= \log_e \frac{(x+1)^4 (x+3)}{(x-2)^3} + C //$$

$$3) \int \frac{1}{(x^2+12)^2} = \int \frac{1}{x^2+12} \cdot \frac{1}{x^2} = \int \frac{1}{(x+11)^2}$$

$$= \int (x+11)^{-2} = \frac{(x+11)^{-1}}{-1} = \frac{-1}{(x+11)} + C$$