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Class - Work

Tibe (Aidera)
Computer Engineer
19/ENG02/020

MAT 104

1. $(11-3x) / (x^2+2x-3)$

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

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

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

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

$$\text{Let } x-1=0 \Rightarrow x=1$$

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

$$11-3 = 4A \quad A=2$$

$$8 = 4A$$

$$2 = A$$

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

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

$$11+9 = -4B$$

$$20 = -4B$$

$$B = -5$$

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

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

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

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

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

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

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

$$2(-1)^2 - 9(-1) - 35 = A(-1-2)(-1+3) \quad (-1+3)$$

$$2 + 9 - 35 = -6A$$

$$10 - 35 = -6A$$

$$-25 = -6A$$

$$A = \frac{-25}{-6} = \frac{25}{6}$$

$$\text{let } (x-2)=0 \quad x=2$$

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

$$8 - 18 - 35 = 15B$$

$$-45 = 15B$$

$$B = \frac{-45}{15}$$

$$B = -3$$

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

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

$$18 + 27 - 35 = 10C$$

$$10 = 10C$$

$$C=1$$

$$\frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} = \frac{25}{6(x+1)} - \frac{3}{(x-2)} + \frac{1}{(x+3)}$$

$$\int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} = \int \frac{25}{6(x+1)} - \int \frac{3}{(x-2)} + \int \frac{1}{x+3}$$

$$\frac{25}{6} \int \frac{1}{(x+1)} - 3 \int \frac{1}{x-2} + \int \frac{1}{x+3}$$

$$= \int \frac{25}{6(x+1)} - \int \frac{3}{(x-2)} + \int \frac{1}{x+3}$$

$$\frac{25}{6} \log_e e^{(x+1)} - 3 \log_e e^{(x-2)} + \log_e e^{(x+3)}$$

$$\log_e \frac{e^{25/6 (x+1)}}{(x-2)^3} + C$$

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

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

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