

IT YOGANANDA FOUNDATION MULTIPUR
19/11/2019
MBBS

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

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

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

$$11-3 = A(0) + 4B$$

$$8 = 4B$$

$$B = 2$$

$$f(-5)$$

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

$$11+9 = A(-4) + B(0)$$

$$20 = -4A$$

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

$$-5$$

$$A = -5$$

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

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

$$\text{let } u = x+3 \quad \frac{du}{dx} = 1 \quad dx = du$$
$$\int \frac{-5}{u} du = -5 \int \frac{1}{u} du = -5 \ln u = -5 \ln(x+3)$$

$$\int \frac{2}{x-1} dx$$

$$\text{let } u = x-1 \quad \frac{du}{dx} = 1 \quad dx = du$$
$$\int \frac{2}{u} du = 2 \int \frac{1}{u} du = 2 \ln u = 2 \ln(x-1)$$

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

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

$$\frac{4x-16}{(x+1)(x-3)} = \frac{A}{x+1} + \frac{B}{x-3}$$
$$4x-16 = A(x-3) + B(x+1)$$
$$f(3) = A(3-3) + B(3+1)$$
$$12-16 = A(0) + B(4)$$
$$-4 = 4B$$
$$B = -1$$

$$f(-1) = A(-1-3) + B(-1+1)$$
$$-4-16 = A(-4) + B(0)$$
$$-20 = -4A$$
$$A = \frac{-20}{-4}$$
$$A = 5$$

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

$$\int \frac{5}{x+1} dx$$

$$\text{let } u = x+1 \quad \frac{du}{dx} = 1 \quad dx = du$$

$$\int \frac{5}{u} du = 5 \int \frac{1}{u} du = 5 \ln u = 5 \ln(x+1)$$

$$\int \frac{-1}{x-3} dx$$

$$\text{let } u = x-3, \quad \frac{du}{dx} = 1 \quad dx = du$$

$$\int \frac{-1}{u} du = -1 \int \frac{1}{u} du = -\ln u = -\ln(x-3)$$

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

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

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

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

$$2x^2 - 9x - 35 = A(x^2 - 2x + 3) + B(x^2 + 4x + 3) + C(x^2 - 2x - 2)$$

$$2x^2 - 9x - 35 = A(x^2 - 2x + 3) + B(x^2 + 4x + 3) + C(x^2 - 2x - 2)$$

$$2x^2 - 9x - 35 = A(x^2 - 2x + 3) + B(x^2 + 4x + 3) + C(x^2 - 2x - 2)$$

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

$$-45 = 0 + 15B + 0$$

$$-45 = 15B$$

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

$$B = -3$$

$$f(-3)$$

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

$$18 + 27 - 35 = A(-5)(0) + B(-2)(0) + C(-2)(-5)$$

$$224 = 6A + 0 + 10$$

$$214 = 6A$$

$$10 = 10C$$

$$C = 1$$

$$f(-1)$$

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

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

$$-24 = -6A + 0 + 0$$

$$-24 = -6A$$

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

$$A = 4$$

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

$$\int \frac{4}{x+1} dx$$

$$\text{Let } u = x+1 \quad \frac{du}{dx} = 1 \quad dx = du$$

$$\int \frac{4}{x+1} dx = \int \frac{4}{u} du = 4 \int \frac{1}{u} du = 4 \ln |u| = 4 \ln |x+1|$$

$$\text{Let } u = x - 2 \quad \frac{du}{dx} = 1 \quad dx = du$$

$$\int \frac{-3}{x-2} du = \int \frac{-3}{u} du = -3 \int \frac{1}{u} du = -3 \ln|x-2|$$

$$\text{Let } u = x + 3, \quad \frac{du}{dx} = 1 \quad dx = du$$

$$\int \frac{1}{x+3} dx = \int \frac{1}{u} du = \ln|u| = \ln|x+3|$$

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