

Anshu Mehta Chohan
 Computer Engineering
 19/ Engg 02/ 045
 Math 104 SN: 46

$1 \int \frac{11-3x}{x^2+2x-3} dx$ $\int \frac{11-3x}{x^2+2x-2-3}$ $\int \frac{11-3x}{x(x+3)-1(x+3)}$ $\int \frac{11-3x}{(x-1)(x+3)}$ $\frac{11-3x}{(x-1)(x+3)} = \frac{A}{x-1} + \frac{B}{x+3}$ $11-3x = A(x+3) + B(x-1)$ <p>When $x = -3$</p> $11-3(-3) = A(-3+3) + B(-3-1)$ $11+9 = B(-4)$ $20 = -4B$ $B = -5$ <p>When $x = 1$</p> $11-3(1) = A(1+3) + B(1-1)$ $11-3 = A(4)$ $8 = 4A$ $A = 2$ $\frac{11-3x}{(x-1)(x+3)} = \frac{2}{x-1} + \frac{-5}{x+3}$ $\int \frac{2}{x-1} dx - \int \frac{5}{x+3} dx$ $2 \int \frac{dx}{x-1} - 5 \int \frac{dx}{x+3}$ $u = x-1 \quad u = x+3$ $\frac{du}{dx} = 1 \quad \frac{du}{dx} = 1$	$\frac{du}{dx} = dx \quad \frac{du}{dx} = dx$ $2 \int \frac{du}{u} - 5 \int \frac{du}{u}$ $2 \ln u - 5 \ln u + C$ $2 \ln(x-1) - 5 \ln(x+3) + C$
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$$2) \int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} dx$$

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

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

$$2x^2 - 9x - 35 = A(x^2 + 3x - 2x - 6) + B(x^2 + 3x + x + 3) + C(x^2 - 2x + x - 2)$$

$$2x^2 - 9x - 35 = A(x^2 + x - 6) + B(x^2 + 4x + 3) + C(x^2 - x - 2)$$

$$2x^2 - 9x - 35 = Ax^2 + Ax - 6A + Bx^2 + 4Bx + 3B + Cx^2 - Cx + 3B - 2C$$

$$A + B + C = 2$$

$$A + 4B - C = -9$$

$$-6A + 3B - 2C = -35$$

$$A = 2 - B - C$$

$$2 - B - C + 4B - C = -9$$

$$3B - 2C = -11$$

$$-6A = -11 = -35$$

$$-6A = -24$$

$$A = 4$$

$$4 = 2 - B - C$$

$$B = -2 - C$$

$$3(-2 - C) - 2C = -11$$

$$-6 - 3C - 2C = -11$$

$$-5C = -5$$

$$C = 1$$

$$B = -2 - 1$$

$$B = -3$$

$$A = 4, B = -3, C = 1$$

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

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

$$u = x+1$$

$$u = x-2$$

$$u = x+3$$

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

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

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

$$du = dx$$

$$du = dx$$

$$du = dx$$

$$4 \int \frac{du}{u} - 3 \int \frac{du}{u} + \int \frac{du}{u}$$

$$4 \ln u - 3 \ln u + \ln u + C$$

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

3

$$\int \frac{dx}{\sqrt{x^2 + 121}}$$

$$\int \frac{dx}{\sqrt{x^2 + 11^2}}$$

$$x = 11 \tan \theta$$

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

$$d\theta$$

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

$$x^2 + 11^2 = 11^2 \tan^2 \theta + 11^2$$

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

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$x^2 + 11^2 = 11^2 \sec^2 \theta$$

$$\int \frac{11 \sec^2 \theta d\theta}{11^2 \sec^2 \theta}$$

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

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

$$\frac{1}{11}$$

$$+ \theta + C$$

$$\frac{1}{11}$$

$$x = 11 \tan \theta$$

$$x = 11 \tan \theta$$

$$\tan^{-1}\left(\frac{x}{11}\right) = \theta$$

$$\frac{1}{11} \tan^{-1}\left(\frac{x}{11}\right) + C$$

