

Algebraic Equations Worksheet/Ans Computer Science.

Q)  $\frac{3x-1}{(x-1)(x-2)(x-3)}$

$$\frac{3x-1}{(x-1)(x-2)(x-3)}$$

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

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

$$3x-1 = Ax^2 - 5A + 6A + Bx^2 - 4Bx + 3B + Cx^2 - 3Cx + 2C$$
$$= (A+B+C)x^2 + (-5A-4B-3C)x + (6A+3B+2C)$$

$$-1 = 6A + 3B + 2C \quad \dots i$$

$$3 = -5A - 4B - 3C \quad \dots ii$$

$$0 = A + B + C \quad \dots iii$$

$$A = -B - C$$

$$6(-B-C) + 3B + 2C = -1$$

$$-5(-B-C) - 4B - 3C = 3$$

$$-3B - 4C = -1 \quad \dots (iv)$$

$$3B + 2C = 3 \quad \dots (v)$$

$$B = 3 - 2C$$

$$-3(3-2C) - 4 = -1$$

$$-9 + 6C - 4 = -1$$

$$-4 + 2C = -1$$

Sub (v) in (iv)

$$3B - 6 = -1$$

$$B = 5$$

$$-1 = 6A - 15 + 8$$

$$= 6A - 7 + 8$$

$$= 6A + 1$$

$$A = -1$$

$$\frac{3x-1}{(x-1)(x-2)(x-3)} = \frac{1}{x-1} - \frac{5}{x-2} + \frac{4}{x-3}$$

$$\int \frac{3x-1}{(x-1)(x-2)(x-3)} dx = \int \frac{1}{x-1} dx - \int \frac{5}{x-2} dx + \int \frac{4}{x-3} dx$$

$$= \ln|x-1| - 5\ln|x-2| + 4\ln|x-3|$$

$$\int \frac{x^2 + x + 1}{(x+2)(x^2+1)} dx$$

$$\frac{x^2 + x + 1}{(x+2)(x^2+1)} = \frac{A}{x+2} + \frac{Bx+C}{x^2+1}$$

$$x^2 + x + 1 = (x^2+1)A + (x+2)(Bx+C) = (Bx+C)$$

$$x^2 + x + 1 = Ax^2 + Bx^2 + Cx + 2Bx + 2C + Bx + C$$

$$= (A+B)x^2 + (C+2B)x + (A+2C)$$

$$1 = A + 2C$$

$$1 = C + 2B$$

$$1 = B + C$$

$$(A, B, C) = \left( \frac{1}{5}, \frac{2}{5}, \frac{3}{5} \right)$$

$$\frac{1/5}{x+2} + \frac{2/5x + 3/5}{x^2+1}$$

$$\frac{1}{5(x+2)} + \frac{2x+3}{5(x^2+1)}$$

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

$$\frac{3}{5} \times \ln(|x+1|) + \frac{1}{5} \ln(x^2+1)$$

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

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

$$\begin{aligned} x(x+1) &= (x-2)^2 A + (x-3) \times (x-2) B + (x-3) C \\ &= Ax^2 + Bx^2 + 4Bx - 4Bx + C + 2Bx + 6B - 3x \\ &= (A+B)x^2 + (C-4A-5B)x + (3A+6B) \end{aligned}$$

$$1 = 4A + 6B - 3C$$

$$0 = -4A - 5B + C$$

$$1 = A + B$$

$$(A \ B \ C) = (10 \ -4 \ -5)$$

$$\frac{x^2+1}{(x-3)(x-2)^2} = \frac{10}{x-3} - \frac{4}{x-2} - \frac{5}{(x-2)^2}$$

$$\int \frac{10}{x-3} dx - \int \frac{4}{x-2} dx - \int \frac{5}{(x-2)^2} dx$$

$$10 \ln(|x-3|) - 4 \ln(|x-2|) + \frac{5}{x-2} + C$$

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

$$\frac{x^2}{x-1} + \frac{x^2}{x-1} + \frac{2x}{x-1} + \frac{1}{x-1} dx$$

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

$$\frac{2x^2 + 3x^2 + 6x - 11}{6} + \ln(1x-1) + \frac{2x^2}{2} + x + C$$

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

$$\frac{2x^2 + 3x^2 + 6x - 11}{6} - 4 \ln(1x-1) + C$$