Homework MATH 104

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MBBS

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

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

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

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

$= 11 - 3 = 0 + 4B$

$= 8 = 4B$

$= B = 2$

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

$= 11 + 9 = -4A + 0$

$= 20 = -4A$

$= A = -5$

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

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

(2) $\int \frac{4x-16}{x^2-2x-3} = \int \frac{4x-16}{(x-3)(x+1)}$

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

$4x-16 = A(x+1)+B(x-3)$

$F(-1) = 4(-1)-16 = A(-1+1)+B(-1-3)$

$= -20 = 0 + -4B$

$= -20 = -4B$

$= B = 5$

$F(3) = 4(3)-16 = A(3+1)+B(3-3)$

$= 12-16 = 4A + 0$

$= -4 = 4A$

$= A = -1$

$\int \frac{4x-16}{x^2-2x-3} = \int \frac{5}{(x+1)} - \int \frac{1}{x-3}$

$\boxed{\int \frac{4x-16}{x^2-2x-3} = 5\ln(x+1) - 1\ln(x-3)}$

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

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

$= \frac{A(x^2+1x-6) + B(x^2+4x+3) + C(x^2-1x-2)}{(x+1)(x-2)(x+3)}$

$2x^2-9x-35 = A(x^2+1x-6) + B(x^2+4x+3) + C(x^2-1x-2)$

$F(-1) = 2(-1)^2-9(-1)-35 = A((-1)^2+1(-1)-6) + B(-1)^2+4(-1)+3) + C((-1)^2-1(-1)-2$

$= 2+9-35 = A(-6) + B(0) + C(0)$

$= -24 = -6A$

$= A = 4$

$F(2) = 2(2)^2-9(2)-35 = A(0) + B((2)^2+4(2)+3) + C(0)$

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

$= -45 = 15B$

$= B = -3$

$F(-3) = 2(-3)^2-9(-3)-35 = A(0) + B(0) + C((-3)^2-1(-3)-2)$

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

$= 10 = 10C$

$= C = 1$

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

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