7.5 Day 1

Friday, December 6, 2019 8:26 AM

Partial Fraction Decomp.

Ex: Given $\frac{3}{x^2-x-6} = \frac{A}{(x-3)} + \frac{B}{x+2}$

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

Find A & B

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

when $x=3$ $\quad 3 = A(5) \quad A = 3/5$

when $x=-2$ $\quad 3 = -5B \quad B = -3/5$

Can we use this process to evaluate . . . . YEP!

$$\int \frac{3}{x^2-x-6}\,dx = \int \left[\frac{3/5}{x-3} + \frac{-3/5}{x+2}\right] dx$$

$$\frac{3}{5}\int \frac{1}{x-3}\,dx - \frac{3}{5}\int \frac{1}{x+2}\,dx$$

$$= \frac{3}{5}\ln|x-3| - \frac{3}{5}\ln|x+2| + C$$

what if mc question . . .

$$= \frac{3}{5}\left(\ln|x-3| - \ln|x+2|\right) + C$$

$$= \frac{3}{5}\ln\frac{|x-3|}{|x+2|} + C$$ only if mc

Ex: Evaluate $\int \frac{4}{x^2-2x-3}\,dx$

$$\int \left(\frac{1}{x-3} + \frac{-1}{x+1}\right) dx$$

Alg. work . .

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

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

when $x=3$ $\quad 4 = 4A \quad A = 1$

$x=-1$ $\quad 4 = -4B \quad B = -1$

$\ln|x-3| - \ln|x+1| + C$

$= \ln \frac{|x-3|}{|x+1|} + C$

you try...

$$\int \frac{x-13}{2x^2-7x+3} \, dx = \int \frac{x-13}{(2x-1)(x-3)} \, dx$$

$$\int \left[\frac{5}{2x-1} - \frac{2}{x-3} \right] dx$$

$5 \cdot \frac{1}{2} \ln|2x-1| - 2\ln|x-3| + C$

$\frac{5}{2} \ln|2x-1| - 2\ln|x-3| + C$

side note

$x-13 = A(x-3) + B(2x-1)$

when $x = \frac{1}{2}$ $\quad x = 3$

$-\frac{25}{2} = -\frac{5}{2} A$ $\quad -10 = 5B$

$B = -2$

$A = 5$