Section 28.9: contd

Thursday, February 21, 2013
10:30 AM

evaluate

$$\int \frac{3x^2 - 13x - 6}{x^2 - 6x}\,dx$$

$$x^2 - 6x \;\overline{)\; 3x^2 - 13x - 6}$$

$$\begin{array}{r} 3 \\ 3x^2 - 18x \\ \hline 5x - 6 \end{array}$$

← when the remainder has lower degree than the divisor $(x^2 - 6x)$, you're done!

$$\frac{3x^2 - 13x - 6}{x^2 - 6x} = 3 + \underbrace{\frac{5x - 6}{x^2 - 6x}}_{\text{partial fractions}}$$

$$x(x-6)\left(\frac{5x-6}{x(x-6)}\right) = \left(\frac{A}{x} + \frac{B}{x-6}\right)x(x-6)$$

$$5x - 6 = A(x-6) + Bx$$

when $x = 6$, $24 = 6B$, so $B = 4$

$x = 0$, $-6 = -6A$, $A = 1$

$$\int \frac{3x^2 - 13x - 6}{x^2 - 6x}\,dx = \int \left[3 + \frac{1}{x} + \frac{4}{x-6}\right]dx$$

$$= 3x + \ln|x| + 4\ln|x-6| + C$$