Dawson College: Calculus II: 201-NYB-05 05 March 11, 2011

Last Name: SOLUTIONS

First Name: _____

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Quiz 6 (B)

Question 1. *(10 marks)* Evaluate the following integral:

$$I = \int \frac{x^5 - 2x^4 - 7x^3 + 20x^2 - 12x + 4}{x^3 + x^2 - 6x}\,dx$$

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

$$x^3 + x^2 - 6x \;\big|\; x^5 - 2x^4 - 7x^3 + 20x^2 - 12x + 4$$

$$x^2 - 3x + 2$$

$$-(x^5 + x^4 - 6x^3)$$

$$-3x^4 - x^3 + 20x^2$$

$$-(-3x^4 - 3x^3 + 18x^2)$$

$$2x^3 + 2x^2 - 12x$$

$$-(2x^3 + 2x^2 - 12x)$$

$$0 + 4$$

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

$$4 = A(x+3)(x-2) + Bx(x-2) + Cx(x+3)$$

IF $x = 0$

$4 = -6A \Rightarrow A = -\frac{2}{3}$

IF $x = 2$

$4 = 10C \Rightarrow C = \frac{2}{5}$

IF $x = -3$

$4 = 15B \Rightarrow B = \frac{4}{15}$

$$\therefore I = \int x^2 - 3x + 2 - \frac{2}{3}\cdot\frac{1}{x} + \frac{4}{15}\cdot\frac{1}{x+3} + \frac{2}{5}\cdot\frac{1}{x-2}\,dx$$

$$= \frac{x^3}{3} - \frac{3}{2}x^2 + 2x - \frac{2}{3}\ln|x| + \frac{4}{15}\ln|x+3| + \frac{2}{5}\ln|x-2| + C$$