Dawson College: Calculus II: 201-NYB-05 05

March 25, 2011

Last Name: _____

First Name: _____

Student ID: _____

Test 2 (B)

Question 1. *(3 marks).* Evaluate the indefinite integral.

$$\int \cos^2 5x \, dx$$

Question 2. *(5 marks).* Evaluate the indefinite integral.

$$\int_0^1 \arctan x \, dx$$

Question 3. *(3 marks)* Write the partial fraction decomposition of the following fraction. Do not determine the numerical values of the coefficients.

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

Question 4. *(5 marks)* Evaluate the following integral.

$$\int \frac{1}{x^2\sqrt{16-x^2}}\,dx$$

Question 5. *(5 marks).*
(a) Prove the reduction formula

$$\int (\ln x)^n dx = x(\ln x)^n - n\int (\ln x)^{n-1} dx$$

(b) Use this formula to evaluate

$$\int (\ln x)^3 dx$$

Question 6. *(2 marks)* Evaluate the following integral.

$$\int_{-\pi/3}^{\pi/3} \frac{(x^6 - x^2 + 2)\sin x}{\cos x} dx$$

Question 7. *(5 marks)* Evaluate the following integral.

$$\int_{3\pi/4}^{\pi} \sec^6 x\, dx$$

Question 8. *(5 marks)* Evaluate the following integral.

$$\int \frac{x^2+x-18}{x^3+9x}dx$$

Question 9. *(5 marks)* Evaluate the following integral.

$$\int \frac{x^4+6x^2-20x+1}{x^2+2x+10}dx$$

Question 10. *(3 marks).* If f is continuous and

$$\int_1^4 f(x)\,dx = 24 \quad \text{find} \quad \int_0^1 x^3 f(3x^4+1)\,dx.$$

Clearly show your work.

Bonus. *(3 marks)* Find

$$\int \frac{1}{x^4+1}dx$$

given that

$$\frac{1}{x^4+1} = \frac{\frac{1}{2\sqrt{2}}x+\frac{1}{2}}{x^2+\sqrt{2}x+1} + \frac{-\frac{1}{2\sqrt{2}}x+\frac{1}{2}}{x^2-\sqrt{2}x+1}$$