Math 131 Spring, 2008 Homework 18 Due April 4 Name: __Solutions____

Mathematics Quote: *The concept of number is the obvious distinction between the beast and man. Thanks to number, the cry becomes a song, noise acquires rhythm, the spring is transformed into a dance, force becomes dynamic, and outlines figures.* — **Maistre Joseph Marie de (1753 - 1821)**

1. Reading materials:
Textbook - Page 344-351
(1) Theorems 1.1, 1.2, and 1.3, and formulas in the table on Page 349.
(2) Examples 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11 and 1.12.
(3) Lecture Notes on Section 4.1.

2. Find the general antiderivative:

a. $\int\left(x^{2008} - 2x^{\pi} + \frac{1}{x^2} - \sqrt[3]{x} - \frac{1}{\sqrt{x}} + \frac{3}{x} - \sqrt{2} \right)dx$

$= \int\left(x^{2008} - 2x^{\pi} + x^{-2} - x^{1/3} - x^{-1/2} + \frac{3}{x} - \sqrt{2} \right)dx$

$= \frac{1}{2009}x^{2009} - \frac{2}{\pi+1}x^{\pi+1} - x^{-1} - \frac{3}{4}x^{4/3} - 2x^{1/2} + 3\ln|x| - \sqrt{2}\,x + C$

b. $\int\left(\sin\left(\frac{x}{2}\right) - \cos(\pi x) + 2\sec^2(2x) - 3\sec(x)\tan(x)\right)dx$

$= -2\cos(\frac{x}{2}) - \frac{1}{\pi}\sin(\pi x) + 2(\frac{1}{2})\tan(2x) - 3\sec(x) + C$

c. $\int(3e^{-2x} - 2^x - \pi^x + \pi^\pi)dx$

$= -\frac{3}{2}e^{-2x} - \frac{1}{\ln(2)}2^x - \frac{1}{\ln(\pi)}\pi^x + \pi^\pi x + C$

d. $\int\left(\frac{2}{\sqrt{1-x^2}} + \frac{1}{4x^2+4}\right)dx$

$= 2\sin^{-1}(x) + \frac{1}{4}\tan^{-1}(x) + C$

3. **Page 352**: Turn in the ones with *.

a. 5-30: 10*, 30*
Extra points: 28

b. 39-46: 40*, 42*
Extra points: 44, 46

4. Find the general antiderivative:

a. $\int \frac{g'(x)}{g(x)}\, dx$

b. (i) $\int \frac{1}{x^2+1}dx$ (ii) $\int \frac{x}{x^2+1}dx$ (iii) Extra points: $\int \frac{x^2}{x^2+1}dx$, $\int \frac{x^4}{2-3x^5}dx$

c. $\int \frac{x^2}{x^3+1}dx$ Can we find the general antiderivative of $\int \frac{x}{x^3+1}dx$?

d. (i) $\int \frac{e^x}{e^x+1}dx$ (ii) Extra points: $\int \frac{e^{2x}}{e^{2x}+1}dx$