NAME _____ Rec. Instructor: _____

Signature _____ Rec. Time _____

CALCULUS II - EXAM 1
September 22, 2015

Show all work for full credit. No books, notes or calculators are permitted. The point value of each problem is given in the left-hand margin. You have 65 minutes.

Problem	Points	Points Possible	Problem	Points	Points Possible
1a		12	5a		8
1b		12	5b		8
2		12	5c		8
3		12	6a		8
4		12	6b		8
			Total Score		100

$\frac{d}{dx}\tan x = \sec^2 x$ $\frac{d}{dx}\sec x = \sec x \tan x$

$\frac{d}{dx}\sin^{-1}(x) = \frac{1}{\sqrt{1-x^2}}$ $\frac{d}{dx}\tan^{-1}(x) = \frac{1}{1+x^2}$ $\frac{d}{dx}\sec^{-1}(x) = \frac{1}{|x|\sqrt{x^2-1}}$

$\int \tan x \, dx = -\ln|\cos x| + C$ $\int \sec x \, dx = \ln|\sec x + \tan x| + C$

$\int \frac{dx}{\sqrt{a^2-x^2}} = \sin^{-1}(\frac{x}{a}) + C$ $\int \frac{dx}{a^2+x^2} = \frac{1}{a}\tan^{-1}(\frac{x}{a}) + C$

$$\int \sin^n x \, dx = -\frac{\sin^{n-1} x \cos x}{n} + \frac{n-1}{n}\int \sin^{n-2} x \, dx,$$

$$\int \tan^n x \, dx = \frac{\tan^{n-1} x}{n-1} - \int \tan^{n-2} x \, dx\,,$$

$$\int \sec^n x \, dx = \frac{\sec^{n-2} x \tan x}{n-1} + \frac{n-2}{n-1}\int \sec^{n-2} x \, dx$$

1. Evaluate the following integrals.

(12) a) $\int x^2 \ln(x)\, dx$

(12) b) $\int \sin^4(x)\, dx$

(12) 2. Evaluate the following integral using an appropriate trig substitution.

$$\int \frac{dx}{\sqrt{1+x^2}}$$

(12) 3. Evaluate the following integral using an appropriate substitution.

$$\int \frac{e^x}{(1+e^x)^3}\, dx$$

(12) 4. Evaluate the integral $\int \frac{x+5}{x^3+x}\,dx$

5. Evaluate the following limits or indicate that they diverge.

(8) a) $\lim_{x\to 0} \dfrac{e^{2x} - 2x - 1}{x^2}$

(8) b) $\lim_{x\to\infty} \dfrac{e^{2x} + x}{e^{3x} + 5}$

(8) c) $\lim_{x\to\infty} \left(\dfrac{x+1}{x}\right)^{2x}$

6. Evaluate the improper integrals or show that they diverge. Make careful use of limit notation.

(8) a) $\displaystyle\int_2^5 \frac{dx}{\sqrt{x-2}}$

(8) b) $\displaystyle\int_3^\infty \frac{1}{(x-1)^3}\,dx$