Math 162: Calculus IIA

First Midterm Exam

October 18, 2011

NAME (please print legibly): _____

Your University ID Number: _____

Indicate your instructor with a check in the box:

Yoonbok Lee	MWF 9:00 - 9:50 AM	
Doug Ravenel	MWF 10:00 - 10:50 AM	
Don Larson	MW 11:00 - 11:50 AM	

- **The presence of calculators, cell phones, iPods and other electronic devices at this exam is strictly forbidden.**
- **Show your work and justify your answers. You may not receive full credit for a correct answer if insufficient work is shown or insufficient justification is given.**
- **Put your answers in the space provided at the bottom of each page or half page.**
- **You are responsible for checking that this exam has all 11 pages.**

QUESTION	VALUE	SCORE
1	20	
2	20	
3	20	
4	20	
5	20	
TOTAL	100	

1. (20 points) Evaluate the following integrals:

(a) (10 points)

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

ANSWER:

(b) (10 points)

$$\int_0^{\pi/2} \sin^4 x dx.$$

ANSWER:

2. (20 points)

(a) (10 points) Use integration by parts to find a formula for

$$\int (\ln x)^n \, dx \qquad \text{in terms of} \qquad \int (\ln x)^{n-1} \, dx$$

ANSWER:

(b) (10 points) Use this formula to find

$$\int (\ln x)^2 \, dx.$$

ANSWER:

3. (20 points) (a) (10 points) Find the integral

$$\int_{-1}^{0} \frac{dx}{\sqrt{x^2+4x+3}}$$

ANSWER:

(b) (10 points) Find the integral

$$\int_4^6 \sqrt{8x - x^2}dx.$$

ANSWER:

4. (20 points) Consider the curve

$$f(x) = 2x^{3/2} + 7$$

(a) (10 points) Calculate the arc length function $s(t)$ starting at $x = 0$, that computes the length of the curve from $(0, f(0))$ to $(t, f(t))$.

ANSWER:

(b) (10 points) Calculate the arc length from $x = 2$ to $x = 4$.

ANSWER:

5. (20 points) Consider region between the curves $y = 2x$ and $y = x^2$.

(a) Find the volume of the solid of revolution about the x-axis.

ANSWER:

(b) Find the volume of the solid of revolution about the y-axis.

ANSWER: