Math 162: Calculus IIA

First Midterm Exam
October 19, 2010

NAME (please print legibly): _____

Your University ID Number: _____

Indicate your instructor with a check in the box:

Ang Wei	MWF 9:00 - 9:50 AM	
Doug Ravenel	MWF 10:00 - 10:50 AM	
Jon Carstea	MW 2:00 - 3:15 PM	

- 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)

$$\int \frac{48}{x^4 - 16}\,dx.$$

ANSWER:

(b) (10 points)

$$\int_0^\pi \sin^2 x \cos^2 x\, dx.$$

ANSWER:

2. (20 points) Consider the curve

$$y = f(x) = \frac{e^{2x} + e^{-2x}}{4}.$$

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

ANSWER:

(b) (10 points)　　Calculate the arc length from $x = 1$ to $x = 2$.

ANSWER:

3. (20 points) Consider region between the curves $y = x$ and $y = \sqrt{x}$.

(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:

4. (20 points)

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

$$\int x^{2n} \sin x \, dx \qquad \text{in terms of} \qquad \int x^{2n-2} \sin x \, dx$$

ANSWER:

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

$$\int x^4 \sin x \, dx.$$

ANSWER:

5. (20 points) (a) (10 points)　Find the integral

$$\int_{-3}^{1} \frac{dx}{\sqrt{x^2 + 6x + 25}}$$

ANSWER:

(b) (10 points)   Find the integral

$$\int_0^3 \sqrt{9 - x^2}\, dx.$$

ANSWER: