

# Math 162: Calculus IIA

First Midterm Exam

October 11, 2016

NAME (please print legibly): \_\_\_\_\_

Your University ID Number: \_\_\_\_\_

Your University email \_\_\_\_\_

Indicate your instructor with a check in the box:

Jie Zhong	MWF 9:00 - 9:50 AM	<input type="checkbox"/>
Doug Ravenel	MWF 10:25 - 11:15 AM	<input type="checkbox"/>
Doug Haessig	MW 12:30 - 1:45 PM	<input type="checkbox"/>
Carl McTague	MW 4:50-6:05 PM	<input type="checkbox"/>

## Pledge of Honesty

I affirm that I will not give or receive any unauthorized help on this exam and that all work will be my own.

Signature: \_\_\_\_\_

- The presence of calculators, cell phones, iPods and other electronic devices at this exam is strictly forbidden. **IF YOU HAVE YOUR PHONE WITH YOU, YOU MUST TURN IT IN TO A PROCTOR BEFORE STARTING THE EXAM. FAILURE TO DO SO WILL BE TREATED AS AN ACADEMIC HONESTY VIOLATION.**
- 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 9 pages.

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

**1. (20 points)**

(a) Use integration by parts twice to express  $I_n = \int x^n \cos x \, dx$  in terms of  $I_{n-2}$  for  $n \geq 2$ .

ANSWER:

(b) Use the formula of part (a) repeatedly to find  $I_4$ .

*You will not get partial credit here if the formula you are using is incorrect.*

ANSWER:

**2. (20 points)**

A heavy rope, 20 ft long, weighs 0.5 lbs/ft and hangs over the edge of a building 100 ft high. How much work is done in pulling half the rope to the top of the building?

ANSWER:

**3. (20 points)** Consider the region bounded by the  $x$ -axis and the curve  $y = \sin x$  for  $0 \leq x \leq \pi$ .

(a) Find the volume of the solid obtained by rotating it about the  $x$ -axis.

ANSWER:

b) Find the volume of the solid obtained by rotating the same region about the  $y$ -axis.

ANSWER:

**4. (20 points)**

Compute the definite integral

$$\int_{\sqrt{2}}^{\sqrt{6}} \frac{dx}{(2x^2 - 3)^{3/2}}.$$

ANSWER:



**5. (20 points)**

Evaluate the following integral:

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

ANSWER: