Math 162: Calculus IIA

First Midterm Exam

October 8, 2019

NAME (please print legibly): _____

Your University ID Number: _____

Your University email _____

Indicate your instructor with a check in the box:

Saul Lubkin	MW 9:00 - 10:15 AM	
Doug Ravenel	MWF 10:25 - 11:40 AM	
Charles Wolf	MW 12:30 - 1:45 PM	
Rufei Ren	MW 4:50 - 6:05 PM	

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 12 pages.**

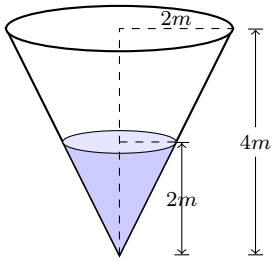
1. (20 points)

Evaluate the indefinite integral:

$$\int \tan^3(Ax + B)dx$$

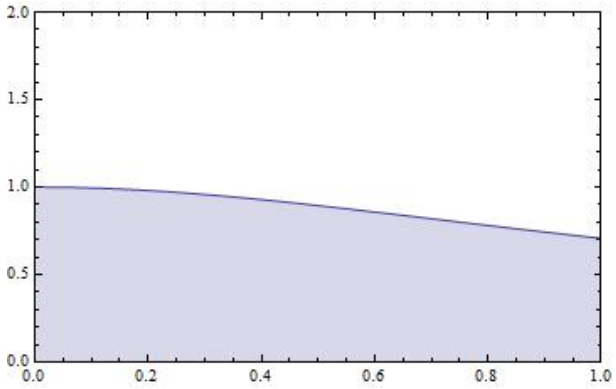
ANSWER:

2. (20 points) A cone shaped tank 4 meters high with a radius of 2 meters at the top contains water of height 2 meters. Find the work done pumping the water to the top of the tank. (The water density is $\rho = 1000kg/m^3$ and the gravity constant is $g = 10m/s^2$)



ANSWER:

3. (20 points)



Consider the region $\mathcal{R}$ bounded by the x-axis, y-axis, the line $x = 1$, and $y = \frac{1}{\sqrt{1+x^2}}$.

(a) **(10 points)** Compute the volume of the solid obtained by revolving $\mathcal{R}$ about the x-axis.

ANSWER:

(b) **(10 points)** Compute the volume of the solid obtained by revolving $\mathcal{R}$ 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

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

ANSWER:

(b) (10 points) Find the integral

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

ANSWER:

Scratch paper

Scratch paper