Math 162: Calculus IIA

Second Midterm Exam

April 2, 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	
Rufei Ren	MW 2:00 - 3:15 PM	
Martin Snow	MW 3:25 - 4:40 PM	
Amanda Tucker	TR 9:40-10:55 AM	

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.

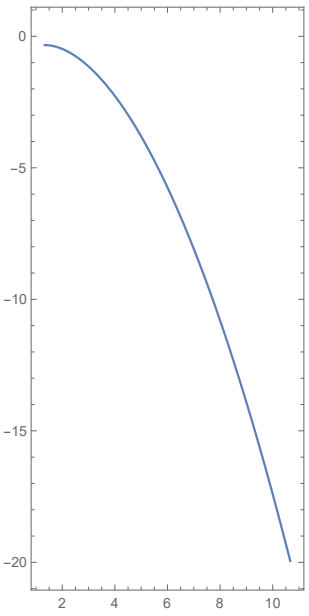
Signature: _____

- **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) Consider the curve C defined by the parametric equations

$$x = \frac{4\sqrt{t^3}}{3} \qquad \text{and} \qquad y = \ln(t) - \frac{t^3}{3} \qquad \text{for } t > 0.$$

Find the length of the curve C between the points $\left(\frac{4}{3}, -\frac{1}{3}\right)$ and $\left(\frac{32}{3}, 2\ln(2) - \frac{64}{3}\right)$.



ANSWER:

2. (20 points) Determine if the following sequences are convergent or divergent. If it is convergent, give its limit.

(a)

$$\{\cos(n^2\pi) : n \geq 0\}.$$

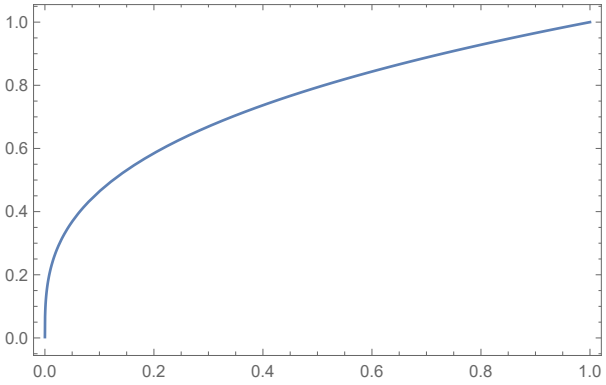
ANSWER:

(b)

$$\left\{ \frac{1-\cos(1/n)}{\sin^2(1/n)} : n \geq 1 \right\}.$$

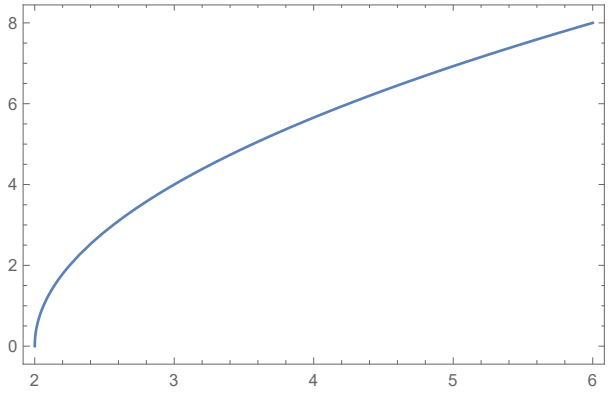
ANSWER:

3. (20 points) (a) Find the area of the surface obtained by rotating the curve $y = \sqrt[3]{x}$ about the y-axis for $0 \leq y \leq 1$.



ANSWER:

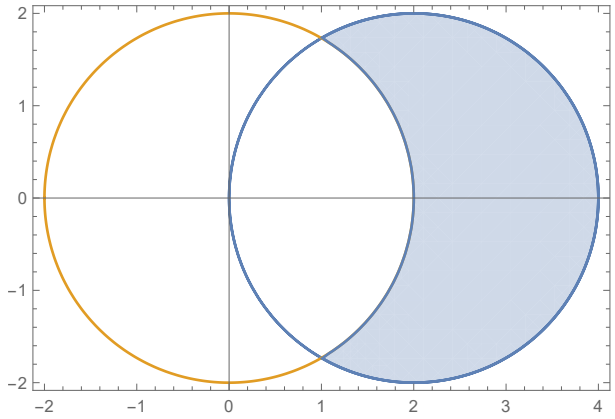
(b) The curve $16x = y^2 + 32$ is rotated about the x-axis from $x = 2$ to $x = 6$. Find the area S of the resulting surface.



ANSWER:

4. (20 points)

(a) Find the area inside the polar curve $r = 4\cos(\theta)$ and outside the polar curve $r = 2$.



ANSWER:

(b) Find the arc length of the boundary of the region inside the polar curve $r = 4\cos(\theta)$ and outside the polar curve $r = 2$ (the region from part (a)).

ANSWER:

5. (20 points)

(a) Let $a > 0$ be a fixed positive number. Compute the definite integral

$$\int_{a\sqrt{2}}^{2a} \frac{dx}{\sqrt{x^2 - a^2}}.$$

ANSWER:

(b) Find the integral

$$\int \frac{1}{\sqrt{x^2+6x+10}}\,dx.$$

ANSWER:

Scratch paper