Math 162: Calculus IIA

Second Midterm Exam

November 17, 2015

NAME (please print legibly): _____

Your University ID Number: _____

Your University email _____

Indicate your instructor with a check in the box:

JJ Lee	MWF 9:00 - 9:50 AM	
Doug Ravenel	MWF 10:25 - 11:15 AM	
Timur Akhunov	MW 12:30 - 1:45 PM	
Eyal Neuman	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 11 pages.**

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

1. (20 points)

The following are convergent series. Find the sum of the series (You don't need to justify the convergence of the series, but you should clearly show how you got the answer).

(a)

$$\sum_{n=5}^{\infty} \frac{4}{n^2 - 2n}$$

ANSWER:

(b)

$$\sum_{n=1}^{\infty} \frac{(-1)^n + 1^n}{3^n}$$

ANSWER:

2. (20 points) (a) Find the area of the region that is inside the circle given by $r = 2\sin\theta$ and outside the circle given by $r = 1$ (both equations are in polar coordinates).

ANSWER:

(b) Compute the equation of the tangent line to the circle $r = 2\sin\theta$ at the point of intersection with the circle $r = 1$ in the first quadrant.

ANSWER:

3. (20 points) Determine whether the following series converge or diverge. Justify your answers, making sure to name the convergence test(s) that you are using.

(a)

$$\sum_{n=1}^{\infty} \frac{n^3 \sin^2(1/n)}{n+1} = \frac{\sin^2(1)}{2} + \frac{8\sin^2(1/2)}{3} + \frac{27\sin^2(1/3)}{4} + \cdots$$

ANSWER:

(b)

$$\sum_{n=1}^{\infty} n e^{-n^{3/2}} = e^{-1} + 2e^{-\sqrt{8}} + 3e^{-\sqrt{27}} + \cdots$$

ANSWER:

4. (20 points)

Find the arc-length of the parametric curve

$$x = 3\cos t - \cos 3t\,,\ y = 3\sin t - \sin 3t\,,\ 0 \le t \le \pi\,.$$

ANSWER:

5. (20 points)

(a) Compute the area of surface of revolution obtained by rotating the curve $y = x^3$, for $0 \leq x \leq 1$, about the x-axis.

ANSWER:

(b) Do the same for the curve $y = |x|$, for $-1 \leq x \leq 1$.

ANSWER: