Math 132 **Final Exam** **Spring 2016**

Name: _____

ID Number: _____

Section Number: _____

Section	Instructor	Day/Time	Section	Instructor	Day/Time
1	Zhao	MWF 10:10	9	Sunukjian	TuThu 11:30
2	Zhao	MWF 9:05	10	Benincasa	TuThu 4:00
3	Nikolaou	MWF 11:15	11	Farelli	MWF 11:15
4	Nikolaou	MWF 12:20	12	Bates	MWF 12:20
5	Wen	MW 2:30	13	Hart	MWF 1:25
6	Wen	MW 4:00	15	Le	TuThu 11:30
7	Yaping	TuThu 8:30	16	Johnson	TuThu 1:00
8	Lowell	TuThu 10:00			

- No calculators, papers, or notes may be used.
- Please don't just give an answer. Clearly explain how you get it, providing appropriate mathematical details. **An answer with no supporting work will be awarded zero points.**
- This is a 2 hour exam.

Question	Grade
MC Total (Out of 25)	
6 (Out of 20)	a. b.
7 (Out of 15)	a. b.
8 (Out of 20)	a. b.
9 (Out of 20)	a. b.
Total (Out of 100)	

Mutiple Choice Section: Choose the one option that best answers the question. There is no partial credit for questions 1-5.

1. [5 points] Find a polar equation for the curve represented by the Cartesian equation $x = 6$.

   (A.) $r = 6\tan\theta$

   (B.) $r = 6$

   (C.) $r = 6\cos\theta$

   (D.) $r = 6\sec\theta$

2. [5 points] Which of the following is the radius of convergence for the power series?

$$\sum_{n=1}^{\infty}(-1)^n\frac{x^n}{n^2 5^n}$$

   (A) $\frac{1}{5}$

   (B) 1

   (C) 5

   (D) ∞

3. [5 points] For which x values does the following series converge?

$$\sum_{n=1}^{\infty}\frac{x^{n-1}}{3^n}$$

   (A) $-3 < x < 3$
   (B) $-\frac{1}{3} < x < \frac{1}{3}$
   (C) $-3 \leq x \leq 3$
   (D) $-\frac{1}{3} \leq x \leq \frac{1}{3}$

4. [5 points] Consider the integral $\int \ln(2x)\,dx$. Which of the following is true?

   (A) This integral does not exist.
   (B) This integral can be found using integration by parts.
   (C) This integral can be found using u-substitution.
   (D) This integral can be found using trigonmetric substitution.

5. [5 points] Which of the following is a Polar representation of the Cartesian coordinate $(\sqrt{3}, -1)$?

   (A) $\left(2, -\frac{\pi}{3}\right)$

   (B) $\left(2, \frac{5\pi}{6}\right)$

   (C) $\left(2, \frac{5\pi}{3}\right)$

   (D) $\left(2, -\frac{\pi}{6}\right)$

Please fill in your letter answer for questions 1-5 below:

(1) _____ (2) _____ (3) _____ (4) _____ (5) _____

Free Response Portion: Show all work for each of the following questions. Partial credit may be awarded for questions 6-9.

6 (a). [10 points] Evaluate the integral.

$$\int_0^1 x^3(1+x^4)^4\,dx$$

6 (b). [10 points] Represent the following function as a power series. Express your answer in summation notation and simplify completely within the summation.

$$f(x) = \frac{x^2}{(1+4x^3)^2}$$

7 (a). [10 points] Find the Taylor series for the function below. Express your answer in summation notation and simplify completely within the summation.

$$f(x) = \ln(1 + x)$$

Centered at $a = 1$

7 (b). [5 points] The Maclaurin series of $\tan^{-1}(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{2n+1}$.

Determine the Maclaurin series for

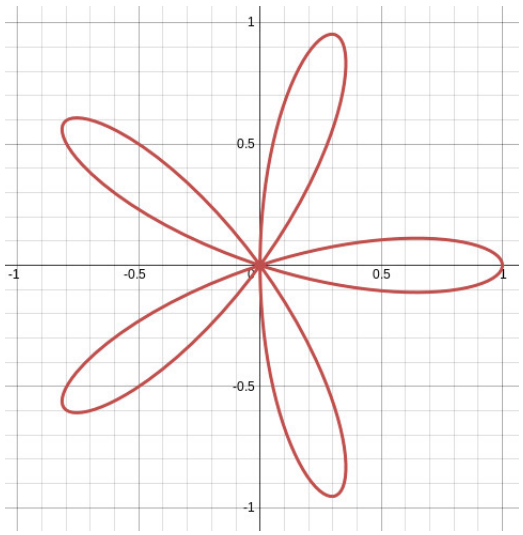
$$f(x) = 9x \tan^{-1}(4x^3)$$

Express your answer in summation notation and simplify completely within the summation.

8 (a). [10 points] Find the radius and interval of convergence of the series. Justify any test you use, and be sure to verify any necessary conditions.

$$\sum_{n=0}^{\infty}(-1)^n\frac{(5x)^n}{3\sqrt{n}+2}$$

8 (b). [10 points] Consider the polar equation $r = \cos(5\theta)$ given in the graph below.



Calculate the area enclosed in one loop of the curve. Mathematically justify how you find the integral bounds.

9 (a). [10 points] Find the exact length of the parametric curve below.

$$x = \frac{1}{2}t^2$$
$$y = \frac{1}{3}(2t+1)^{3/2}$$
$$0 \leq t \leq 4$$

9 (b). [10 points] Find the equation of the line tangent to the parametric curve given below at the given point. Express your answer as $y = f(x)$.

$$x = \sec(t)$$

$$y = \tan(t)$$

$$t = \frac{\pi}{6}$$

This page is intentionally left blank for additional work.