Math 296: Exam 3 **Name:** _____
Spring – 2018
04/13/2018
80 Minutes

Write your name on the appropriate line on the exam cover sheet. This exam contains 9 pages (including this cover page) and 8 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work. If you run out of room for an answer, continue on the back of the page — being sure to indicate the problem number.

Question	Points	Score
1	10	
2	15	
3	10	
4	15	
5	10	
6	10	
7	15	
8	15	
Total:	100	

1. (10 points) Determine whether the following series converge or diverge. Be sure to justify your answer completely.

$$\sum_{n=1}^{\infty} n^3 \sin\left(\frac{1}{n^2}\right)$$

$$\sum_{n=1}^{\infty} \sin\left(\frac{1}{\sqrt[3]{n^5}}\right)$$

2. (15 points) Determine whether the following series converges or diverges. If the series diverges, explain why. If the series converges, find the sum. Be sure to justify your completely.

$$\sum_{n=1}^{\infty} \frac{3^{n-2}}{2^{2n-1}}$$

3. (10 points) Determine whether the following series converge or diverge. Be sure to justify your answer completely.

$$\sum_{n=1}^{\infty} \frac{n^3 + n\sin^2 n}{n^5 + n + 1}$$

$$\sum_{n=2}^{\infty} \frac{\sqrt{n^2 + n - 1}}{n^{3/2} - 1}$$

4. (15 points) Determine whether the following series diverges, converges conditionally, or converges absolutely. Be sure to justify your answer completely.

$$\sum_{n=1}^{\infty} (-1)^n \frac{n}{n^2+4}$$

5. (10 points) Determine whether the following series diverges, conditionally converges, or converges absolutely. Justify your answer completely.

$$\sum_{n=1}^{\infty} \left(\frac{2n^2 + n - 1}{3n^2 - n + 4} \right)^n$$

6. (10 points) Determine whether the following series diverges, conditionally converges, or converges absolutely. Justify your answer completely.

$$\sum_{n=0}^{\infty} \frac{n!}{5^n}$$

7. (15 points) Determine the center, radius of convergence, and interval of convergence for the following power series:

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

8. (15 points) Find the first 4 nonzero terms of the Taylor series $f(x) = \dfrac{1}{x^2}$ centered at $x = 1$.