Calculus II - Exam 3 - Spring 2013

April 25, 2013

Name:
Honor Code Statement:

Additional Statement: I have not observed another violating the Honor Code.

Signature:

Directions: Justify all answers/solutions. Calculators, notes and texts are not permitted. The point value of each problem is indicated in brackets. When you use a particular theorem or test, please **give the name** of the result you are using. Good luck!

1. [4] Define what it means for a sequence to be **bounded**.

2. [6] Determine whether the given sequence is increasing, decreasing, or not monotonic. Is the sequence bounded? Justify your answers!

$$a_n = \frac{1}{5^n}$$

Therefore by the Monotonic Sequence Theorem this sequence is . . . . . .

All further questions are [10] points each.

3. Determine whether the series is convergent. If it is convergent find its sum.

(i) $1 + 0.4 + 0.16 + 0.064 + ...$

(ii) $\sum_{n=1}^{\infty} \frac{(-6)^{n-1}}{5^n}$

4. Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{7n - n^{1/3}}{n^5}$$

5. Use the integral test to determine if the following sequence converges or diverges.

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

6. Test the series for convergence.

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

7. Test for absolute convergence.

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

8. Find the radius of convergence and interval of convergence.

$$\sum_{n=1}^{\infty} \frac{x^n}{n3^n}$$

9. Find a power series representation for the function.

$$f(x) = \frac{1}{1 + 9x^2}$$

10. Find the Taylor series for $f(x)$ (assuming that it has one) centered at the value $a = 2$

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