Calculus II - Exam 3 - Fall 2022

November 17, 2022

Name:
Honor Code Statement:

Directions: Upon completion of the examination and prior to its submission, please write and sign the Honor Code. **Justify** all answers/solutions. Calculators are not permitted, and all electronic devices should be off. Good luck!

1. [5 points] Give an example of a bounded *sequence* that is monotonically decreasing and bounded from below by 3. Give another example of a *sequence* that diverges.

2. [8 points each] **Complete each of the following using the indicated test.** For each of the following series, determine whether or not the series converges. If the series contains any negative terms, please test for absolute convergence.

(a) Use the Comparison Test

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

(b) Use the Test for Divergence

$$\sum_{n=1}^{\infty} \frac{n+1}{n}$$

(c) Use the Ratio Test

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

(d) Use the Root Test

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

(e) Use the Integral Test

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

3. [5 points] Express the repeating decimal $5.232323\ldots$ as the ratio of two integers.

4. [10 points] Find the Taylor Series for $f(x) = \cos x$ at $a = \frac{\pi}{2}$. Then use the third-degree Taylor polynomial to give an estimate for $\cos(2)$.