Review for Exam 3

MAT 229, Spring 2021

Week 11

Exam rules

- The third exam is schedule for this weekend. *It consists of one part only, a pen and paper part taken under Lockdown Browser.*

- You can have one page of notes (front and back) and a scientific calculator but no other notes, books, Mathematica, or other devices are allowed.

- You can take it any time between Friday, March 26, 8:00 pm ET and Sunday, March 28, 8:00 ET.

Format

- Questions will be similar to daily homework questions and weekly assignment questions.

- On the pen and paper part you must show your work. For example, if you need to evaluate a definite integral, you must derive the antiderivative and express how you evaluate it.

Topics

- Improper integrals

- Taylor polynomial
    - Taylor theorem and remainder

- Sequences and the basics of series
    - Sequences are like functions, series are like integrals of functions.
    - If a series converges, approximate it with a partial sum.
    - Know what a geometric series is, under what circumstances it converges, and if it does converge what it converges to.

- Divergence test says if the individual terms do not tend to zero, the sum must diverge. (It says nothing about what may happen if the individual terms do approach zero.)

- Integral test says you can compare a series to an associated improper integral, if everything is positive and decreasing.
    - Be familiar with p-series and under what circumstances they converge.

- Integral test error estimate gives us a way to analyze the error in approximating a convergent series with a partial sum, if the integral test applies to the series.

- Comparison tests

  - Typically the two types of series involved in comparisons are

    - Geometric series, and

    - p-series

  - The limit comparison test says to focus on the significant terms. This test gives you no way to analyze the error in approximating series with partial sums.

  - The inequality comparison test only tells you something if you can

    - find a convergent series that is bigger than the given series (implying the given one also converges), or

    - a divergent series that is smaller than the given series (implying the given one also diverges.

    If it compares well with a convergent series, you can use the comparison series to analyze the error in approximating the given series with partial sums.

- Alternating series test

  - Has to be an alternating series for the test to apply and has to have the terms go to zero.

  - Alternating series test error estimate.