Midterm 2 Conceptual Review

MATH 146, Fall 2019

- Midterm 1 is on **Tuesday, November 5** from **5:50–7:50 pm** in our classroom.
- The exam will cover the material from class related to the the text, and focused on sections covered after the first midterm:

  $$7.7 \text{ and } 10.1 - 10.7.$$

  That said, the exam is **cumulative**, so problems will also rely on concepts covered earlier: $5.3,\ 5.7,\ 6.1 - 6.5,\ 7.1 - 7.3,\ 7.5,\ 11.1$.
- The best preparation is to **practice, practice, practice** working and re-working problems. This includes **book problems** and **quiz problems**.
- Check out the **Daily Update** to check whether you are familiar with all the topics.
- Check out **extended office hours** posted on the course website.

Improper integrals (7.7)

- **Concepts**: Improper integral, convergence/divergence of an improper integral, value of an improper integral, improper integral with infinite endpoint(s), improper integral where integrand is not continuous at an endpoint of interval of integration, improper integral where integrand is not continuous at some point inside the interval of integration, p-integral whose integrand is $\frac{1}{x^p}$, comparison test for improper integrals
- **Goals** and associated homework problems/practice problems:
  - Determine the convergence/divergence of an improper integral with infinite endpoint(s), and determine its value if it converges: 7.7: #2, 3, 7, 13, 35, 41, 42, 45, 50, 51, 53 / 44, 46
  - Determine the convergence/divergence of an improper integral whose integrand is not continuous in the interval of integration, and its value if it converges: 7.7: #12, 37 / 11, 17, 39, 43
  - Apply the comparison test for improper integrals, possibly using the conditions under which a p-integral converges/diverges: 7.7: #54, 56, 55, 65, 66, 71, 73, 75 / 59, 76

Infinite sequences (10.1)

- **Concepts**: Infinite sequence, recursive/explicit definition of a sequence, convergence/divergence of a sequence, limit of a sequence, sequence defined by a function, limit laws for sequences, squeeze theorem for sequences, bounded sequences, monotonic sequences, the convergence of bounded monotonic sequences
- **Goals** and associated homework problems/practice problems:

- Determine whether a sequence converges or diverges, using a variety of techniques: 10.1: # 17, 23, 45 - 47, 53, 60, 61, 69, 74, 83 / 25, 29, 59, 67, 69

Infinite series $(10.2 - 10.5)$

- **Concepts**: Infinite series, convergence/divergence of an infinite series, value of an infinite series, geometric series, p-series, absolute/conditional convergence of infinite series, tests for convergence/divergence of infinite series: divergence test, integral test, direct/limit comparison test, alternating series test, ratio test, root test
- **Goals** and associated homework problems/practice problems:
  - Write the general term of a series and determine its convergence/divergence and value (if appropriate) using the definition: 10.2: #2, 12, 14 - 16, 18, 20, 48 / 21, 45, 47, 55
  - Apply an appropriate test to determine the convergence/divergence of a series, after checking the test's hypotheses:
    - 10.2: #27 / 43, 46
    - 10.3: #5, 11, 15, 16, 19, 29, 41, 45, 63, 69, 71, 77 / 17, 26, 38, 79
    - 10.5: #11, 16, 17, 21, 23, 29, 37, 39, 50, 59 / 31 - 33, 35, 53, 62
  - Determine whether a series converges absolutely, converges conditionally, or diverges: 10.4: # 5, 7, 9, 11, 13, 33 / 6, 8, 33, 35

Power series $(10.6 - 10.7)$

- **Concepts**: Power series centered at c, radius/interval of convergence of a power series, differentiation/integration of power series, power series representation of a function, Taylor series, Maclaurin series, power series representations of familiar functions, binomial series
- **Goals** and associated homework problems/practice problems:
  - Find the interval/radius of convergence of a given power series: 10.6: #1 - 4, 9, 11, 12, 19 / 5, 29, 33
  - Find a power series representation of a given function: 10.6: #36, 39, 40, 42, 43, 45 - 47, 51, 52 / 41, 53, 54
  - Compute a Taylor/Maclaurin series of a given function, and decide whether the series represents the function: 10.7: #1, 3, 13, 33, 43, 59, 65, 67 / 70, 88, 89
  - Apply power series concepts: 10.7: #46, 49, 53, 58, 59, 67, 86 / 74, 77