Exam III Overview

We have an exam scheduled for November 5, 2021. It will cover sections 8.5, 9.1, 9.2, 9.3, 9.4, and 9.5. The exam will have about 10 problems. The exam will be out of 80 points, 50 minute duration, and **notes will NOT be allowed**. However, I will provide the table of indefinite integrals. Use of the free **Desmos Test Mode App** is permitted but you **MUST** inform the instructor before beginning the exam.

Suggestions:

- Create practice exams for yourself based on the above information and give yourself 50 minutes to work through the problems.
- Make sure that you know how to do all of the homework problems, the problems presented in the lecture slides, and quiz problems.
- Do not forget integration by substitution, by parts, trigonometric substitution and that you can use the integral table.
- Spend more time on sections/problems that you do not understand and much less time on problems that you already know.
- If you work on lecture problems, do not have the solutions in front of you while working. Solve the problem, then check your solution.

Section 8.5: Applications to Physics

In physics the word "work" has a technical meaning which is different from its everyday meaning. Physicists say that if a constant force, F , is applied to some object to move it a distance, d, then the force has done work on the object. The force must be parallel to the motion (in the same or the opposite direction). We make the following definition: $W = F(\text{force}) \cdot d(\text{distance})$.

Work (Video),
Problem Examples: Textbook Section 8.5 Exercises/Problems 13, 18, 19, 20, 25, 28.

Section 9.1: Sequences

A sequence1 is an infinite list of numbers $s_1, s_2, s_3, \ldots, s_n, \ldots$. We call s_1 the first term, s_2 the second term; s_n is the general term. For example, the sequence of squares, $1, 4, 9, \ldots, n^2, \ldots$ can be denoted by the general term $s_n = n_2$. Thus, a sequence is a function whose domain is the positive integers, but it is traditional to denote the terms of a sequence using subscripts, s_n, rather than function notation, $s(n)$.

Sequences (VIDEO).
Problem Examples: Textbook Section 9.1 Exercises/Problems 13,18,23, 30, 56, 59, 63, 64, 75.

Section 9.2: Geometric Series

Adding the terms of a sequence produces a series. For example, we have the sequence $1, 2, 3, 4, 5, 6, \ldots$ and the series $1 + 2 + 3 + 4 + 5 + 6 + \cdots$. This section introduces infinite series of constants, which are sums of the form

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \cdots .$$

The individual numbers, $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}$, etc., are called *terms* in the series. To talk about the *sum* of the series, we must first explain how to add infinitely many numbers.
Geometric Series (VIDEO).
Problem Examples: Textbook Section 9.1 Exercises/Problems 3-6, 19, 21, 22, 23, 25, 41, 42, 45.

Section 9.3: Convergence of Series

This section covers the integral test to determine if a series converges or diverges and introduces the p-series.

Integral Test (VIDEO).

Problem Examples: Worksheet from class on Section 9.3.

Section 9.4: Tests for Convergence

Four methods to test a series for convergence. You need to be able to apply the right test to the appropriate problem.

- **Comparison Test (VIDEO)**
- **Limit Comparison Test (VIDEO)**
- **Ratio Test (VIDEO)**
- **Alternating Series Test (VIDEO)**
- **Choosing a Test for Convergence (VIDEO)**

Problem Examples: Worksheet from class on Section 9.4.

Section 9.5: Power Series and Invervals of Convergence

We use the ratio test to determine the radius and interval of convergence.
Short Video on Power Series (VIDEO)

Problem Examples: Textbook Section 9.5 Exercises/Problems 27-34, 45, 47.