LOGISTICS: Our test will occur on Wednesday, December 12. It will be a 120 minute, no notes, no calculator test. Please bring blank paper on which you will write your solutions.

The successful test-taker will have mastered the following concepts.

UNIFORM CONTINUITY

- Use the $\varepsilon - \delta$ definition to show that a function is uniformly continuous on a given set.
- Understand how you can combine uniformly continuous functions to create new uniformly continuous functions (like scaling a uniformly continuous function, adding uniformly continuous functions, etc).
- Understand why any uniformly continuous function on $A$ is also continuous on $A$.
- Use the fact that a continuous function on a compact set $A$ is uniformly continuous on $A$.

DEFINITION OF THE DERIVATIVE

- Use the definition of the derivative to compute the derivative of a function
- Prove a function is or is not differentiable at a point or on a set
- Understand the relationship between continuity and differentiability

MEAN VALUE THEOREM

- Understand the importance of the various hypotheses in the Mean Value Theorem
- Use the Mean Value Theorem to prove statements about derivatives
- Verify that the Mean Value Theorem is true for various specific examples of functions and intervals

SERIES

- Understand the definition of convergence and divergence of a series
- Use the definition of convergence (with partial sums) to prove that a series does or does not converge
- Understand how the Cauchy condition is equivalent to the convergence of a series
- Know how to use the Divergence Theorem to prove that a series diverges

COMPARISON TESTS

- Understand the Comparison Theorem (and Generalized Comparison Theorem) and how to use it to prove that certain series converge or diverge
- Understand how to prove the Limit Comparison Test using the Comparison Test
- Use the Comparison Test and known convergent/divergent series to quickly show a series converges/diverges.

INTEGRAL TESTS

- Use the Alternating Series Test to prove that a series converges
· Use the Integral Test to prove that a series converges/diverges
· Use the $p$-series Test to prove that a series converges/diverges
· Use the Ratio Test to prove that a series converges/diverges
· Use the Root Test to prove that a series converges/diverges

**Absolute and Conditional Convergence**

· Provide examples of absolute and conditionally convergent series
· Understand the relationship between convergence, absolute convergence, conditional convergence, and divergence.