

**MATH 472**  
**Review sheet for final exam**

• **List of topics**

1. Infinite Series
  - (a) Convergence Tests
  - (b) Absolute and Conditional Convergence
  - (c) Alternating Series
2. Sequences and Series of Functions
  - (a) Pointwise Convergence
  - (b) Uniform Convergence
    - i. Uniformly Convergent Sequences of Continuous Functions
    - ii. Uniformly Convergent Sequences of Integrable Functions
    - iii. Uniformly Convergent Sequences of Differentiable Functions
  - (c) Convergence of Series of Functions & the Weierstrass  $M$ -Test
  - (d) ~~Power Series<sup>1</sup>~~
3. The  $n$ -dimensional space  $\mathbb{R}^n$ : dot product (inner product), norm, orthogonality, ...
4. Open Sets & closed Sets in  $\mathbb{R}^n$ , interior point: just definition (knowing what they mean) is enough
5. ~~Limits and Continuity of Functions of Two Variables~~
6. Differentiation of Functions of Two Variables
  - (a) Partial Derivatives: just knowing how to calculate the partial derivatives of a function is enough
  - (b) Directional Derivative
  - (c) Tangent Plane Approximation
  - (d) Implicit Function Theorem
7. Double (Multiple) Integrals
  - (a) Partitions, Lower Sums, Upper Sums, Archimedes-Riemann Theorem, ...
  - (b) Iterated Integrals and Fubini's Theorem
  - (c) Line Integrals
    - i. Calculating line integrals, work done by a force field
    - ii. The Fundamental Theorem of Line Integrals
    - iii. Conservative Vectors Fields
  - (d) Green's Theorem
  - (e) Change of variables

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<sup>1</sup>a crossed out item indicates a topic taught in the course but not included in the final

• **Results you are expected to be able to state and prove:**

1. Theorem on uniform convergence of a sequence of continuous functions
2. Theorem on uniform convergence of a sequence of integrable functions
3.  $\mathbf{u} \in \mathbb{R}^n$  and  $\mathbf{v} \in \mathbb{R}^n$  are orthogonal if and only if the Pythagorean identity holds.
4. The Cauchy-Schwarz Inequality
5. The Fundamental Theorem of Line Integrals
6. Green's Theorem