

Standards for Calculus I Math 172

This course introduces students to the theory, techniques, and applications of differentiation of the elementary functions.

Pre-Requisite Skills

Students will be able to

- Demonstrate competence in functional notation;
- Work with linear, quadratic, exponential, logarithmic, and trigonometric functions;
- demonstrate understanding of the concepts of “inverse” and “composition.”

Performance Skills

Students will be able to

- Investigate limits and continuity of functions;
- Use l’Hopital’s rule to compute limits;
- Compute derivatives using the definition;
- Differentiate a variety of functions using the basic differentiation rules (power, product, quotient, chain, etc.);
- Use the concept of a derivative of a function, including,
 - Graphical representation related to the slope of the tangent line;
 - Numerical representation related to relative rates of change;
 - Relationship with one-dimensional motion;
 - Modeling rates of change problems (including related rates);
- Use first and second derivatives to describe the behavior of curves;
- Use first and second derivatives to solve optimization problems;
- Use first and second derivatives to create complete graphs of functions.

Technology Skills

Being able to use a graphing calculator to intelligently extract information regarding functions is critical. In particular,

Students will be able to

- Investigate limits of functions;
- Estimate derivatives (at a point) within a desired degree of accuracy;
- Create graphs for derivatives of functions.

Pedagogical Standards

Instructors should attempt to instill certain vital problem-solving and communication skills in their students. The Mathematics Department wishes all students who successfully complete this course to possess the following skills.

Students will be able to

- Apply appropriate technology to solve problems;
- Model phenomena mathematically;
- Work cooperatively with others;
- Read and understand complex mathematical problems;
- Describe the methods used to approach a problem;
- Express solutions in written and oral form.