

# Math 12002 Exam IV Review

Exam IV will be given in class on Tuesday, November 15, 2016. It will cover Sections 4.1 through 4.5 as well as 7.1.

## Basic Skills

- Expand sums given in “sigma notation.”
- Approximate area under a curve and/or definite integrals using Riemann sums (and, of course, compute Riemann sums).
- Computer definite integrals in terms of areas.
- Compute definite integrals using properties of integrals. (For example, given  $\int_0^1 f(x) dx$  and  $\int_0^1 g(x) dx$ , compute  $\int_0^1 f(x) + g(x) dx$ .)
- Compute definite integrals using the Fundamental Theorem.
- Compute values of an antiderivative of a function  $f$  in terms of areas ( $F(x) = \int_a^x f(t) dt$ ) given the graph of  $f$ .
- Find antiderivatives (indefinite integrals) by “inspection” or using substitution (change of variable).
- Compute definite integrals using substitution.
- Find the area between two curves.
- Find a function  $f$  given  $f'$  and the value of  $f$  at one point. (For example, find velocity given acceleration and the value of velocity at one point, find position given acceleration or velocity and the values at certain points.)
- Find the total change in a function  $F$  on an interval given the rate of change. (For example, find displacement or total distance traveled given velocity).
- Find the average value of a function on an interval (for example, average velocity or average temperature).

## Definitions and Theory

- Definition of area under a curve in terms of limits of Riemann sums.
- Definition of the definite integral in terms of limits of Riemann sums.
- Properties of integrals.
- Relation between definite integrals of arbitrary functions and areas of regions bounded by their graphs.
- Fundamental Theorem of Calculus (both parts:  $F(x) = \int_a^x f(x) dx$  is an antiderivative and  $\int_a^b f(x) dx = F(b) - F(a)$ ).