MAT 161-004 and MAT 161-300
Main Topics for Test 4
(Sections 4.9, 5.1 – 5.5, 6.1)
Thursday, Dec. 1, 2011

Antiderivatives

Be able to:

- use antiderivative rules to find the most general antiderivative of a function
- find the formula for f(x), given its derivative and a point on the graph of f
- find a formula for the position function s(t), given information about velocity and/or acceleration

Integration

Be able to:

- express a given Riemann sum as a definite integral
- use properties of the definite integral (there are 12 of them)
- estimate a definite integral from a graph, interpreting the integral as "total signed area"
- use the Midpoint Rule to approximate a definite integral from a table of data
- evaluate definite integrals by the Fundamental Theorem of Calculus:

$$\int_a^b f(x)\,dx = F(b) - F(a) \qquad \text{where} \quad F'(x) = f(x)$$

- find the derivative of an integral with variable limits of integration using:

$$\frac{d}{dx}\left(\int_a^u f(t)\,dt\right) = f(u)\cdot\frac{du}{dx}$$

- find the exact area under a curve by setting up and evaluating a definite integral
- use antiderivative rules and the method of substitution to evaluate indefinite integrals (the most general antiderivative of f)
- use the method of substitution to evaluate definite integrals

Applications

Be able to:

- find displacement and total distance traveled of an object moving on a number line, given its velocity on a time interval
- interpret a definite integral as net change of a function
- find the area between two curves
- answer true/false questions about the concepts of Chapter 5 (see the True-False Quiz on page 416