Objectives for Exam #5

To be well-prepared for Exam #5, you should

- know the definition of an antiderivative of a function
- know all of the formulas for antiderivatives that come from the derivatives of standard functions
- understand summation notation ($\Sigma_{j=m}^{n} a_j$)
- know the meanings of R_N, L_N, and M_N for a function $f(x)$ with domain $[a, b]$ and how to express them using summation notation
- be able to compute the area bounded by a positive function and the x-axis by setting up an appropriate R_N, L_N, and M_N and directly evaluating the limit (i.e., without using the Fundamental Theorem of Calculus) of one of

$$\lim_{N\to\infty} \Sigma_1^N R_N, \quad \lim_{N\to\infty} \Sigma_1^N L_N, \quad \lim_{N\to\infty} \Sigma_1^N M_N$$

- know the definition of a general Riemann sum $R(f, P, C)$ and the meanings of $[a, b]$, f, P, and C
- be able to use Riemann sums to develop an integral formula that computes some quantity (such as total charge on a wire as an integral of linear charge density or volume of a sphere as an integral of linear volume density)
- know the definition of a definite integral and what functions are guaranteed to be integrable
- be able to state both parts of the Fundamental Theorem of Calculus (FTC)
- be able to articulate why the formulas in both parts of the FTC are valid
- be able to use Part 1 of the FTC to evaluate various definite integrals and initial value problems
- understand the meaning of functions defined as integrals ($F(x) = \int_a^x f(t)\ dt$) and how to evaluate them at points and take their derivatives
- understand how definite integrals of rates of change of a function give net change of the function
- know the difference between displacement and total distance travelled by a particle during an interval of time and how to compute both using definite integrals
- know the definition of marginal cost/revenue/profit and how they relate to total cost/revenue/profit
- know the definition of linear charge/mass/volume/area density and how to compute the total charge/mass/volume/area from the linear density function