Preparing for the First Exam

The test covers everything we've done up through the material on applications and modeling discussed on Wednesday, September 19.

In particular:

♦ Be able to <u>test</u> a given function to see if it is a solution to a given differential equation (as on the first quiz).

♦ Expect to have to identify each of three to five first-order differential equations as being "*directly integrable*", "*separable*", "*linear*", or "*none of the above*". You will not be asked (and should not attempt) to solve these equations.

♦ Don't forget what constant solutions are.

♦ Plan on solving a separable first-order differential equation (it will be identitified as separable). You will have to find the general solution to it, and, possibly, also the particular solution satisfying some initial-value problem.

♦ Plan on solving a linear first-order differential equation (it will be identified as linear). You will have to find the general solution to it, and, possibly, also the particular solution satisfying some initial-value problem.

♦ Be able to solve a directly integrable differential equation but do not expect me to actually give you one, except, possibly, as something that arises after a substitution.

♦ Know how to use "substitution" in solving differential equations. I may ask you to just convert one d.e. to another using a substitution, or I may have you completely solve one. If the appropriate substitution is not obvously one of the standard substitutions we discussed (linear or homogeneous), then I will tell you the substitution to use.

♦ Be able to construct a "small" slope field for a given differential equation. Also be able to use a given slope field to graph (approximately) the solution to a given initial value problem, and then find (approxiamately) the value of that solution for some value of x. (If I give you the slope field, I will not give you the actual d.e.)

♦ Regarding applications: My main interest is in you being able to set up the differential equation modeling some given process (e.g.: A rabbit population over time), and then being able to answer simple questions about the process (e.g.: How many rabbits will we eventually have?). <u>Understand how the differential equations are derived</u>. Do not waste your time memorizing equations already derived — I will not simply ask you to model something we've already done with just the numbers changed!