STUDY GUIDE FOR TEST 1

1. CHAPTER SUMMARY

1.1. Differential equations and mathematical models. Emphasize the ability to translate word problems into differential equations. *Example problems: 1.1 32-36.*

1.2. Integrals as general and particular solutions. Most of the problems in this section are similar to problems you have gone through in calculus. Make sure you remember how to integrate polynomials, exponential functions, fractions, and simple trigonometric functions. Also make sure you remember the basic trigonometric and u-substitutions. I won't ask problems as elaborate as the integration problems in your calculus classes, but you should know how to integrate $\sin(2x)$ say. *Example problems: 1.2 1-18.*

Make sure to understand how to solve velocity and acceleration problems. You don't have to memorize the value of acceleration due to gravity. I will give it to you if you need to use it. *Example problems: 24-38.*

1.3. Slope fields and solution curves. Just be sure to understand the concept of slope fields, and be able to both sketch a slope field as in *problems 1.3 21-22*, and to sketch a curve on a given slope field with a given initial condition as in *problems 1.3 1-10.*

Make sure to understand the statement of 1.3 Theorem 1, and to be able to determine if the theorem applies to certain differential equations (such as the ones in *problems 1.3 11-20*)

1.4. Separable equations and applications. Make sure that you are able to identify and solve a differential equation in separable form (*problems 1.4 1-28*). For the application problems in this section, pay particular attention to the growth/decay equation examples (*problems 1.4 33-42*). You will be expected to derive the growth-decay equation, not just to memorize it.

1.5. Linear first-order equations. It is **very important** that you understand the integrating factors method (*Example problems 1.5 1-28*). Please understand the concept, rather than just memorizing equation (6) in the book. Using (6) without any justification in an integrating factor problem in the test will only earn you partial credit.

Make sure to understand the mixture problems (*problems 1.5 33-37*). Understand both the cases where V is constant and where V isn't constant. I will probably not ask questions about cascades of multiple tanks (38-40).

1.6. Substitution methods and exact equations. Make sure to understand all the subsitutions in this chapter (linear, homogeneous, Bernoulli) *Example problems 1.6 1-30.*

Understand how to use Theorem 1 in this chapter, and to solve differential equations in exact form. *Example problems 1.6 31-42.*

Be able to solve reducible second order equations whether missing y or x. *Example problems 1.6 43-54.*