MAT292 Abridged

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September 2019

Contents

0.1   Introduction

The textbook and lectures for this course offer a great comprehensive guide for the methods of solving ODE's. The goal here is to give a very concise overview of the things you need to know (NTK) to answer exam questions. Unlike some of our other courses, you don't need to be very intimately familiar with the derivations of everything in order to solve the problems (though it certainly doesn't hurt). Think of this as a really good cheat sheet.

Chapter 1

Qualitative Things and Definitions

1.1 Definitions

1. Order:

2. Autonomous:

3.

1.2 Qualitative Analytic Methods to Know

1. Phase lines

2. Slope fields

1.3 Types of Equilibrium

1. Asymptotic stable equilibrium

2. Unstable equilibrium

3. Semistable equilibirium

Chapter 2

1st Order ODE's

2.1 Separable 1st Order ODE's

If you can write the ODE as:

$$\frac{dy}{dx} = p(x)q(y)$$

Then you can put $p(x)$ with dx on one side and $q(y)$ with dy on the other and integrate them both so solve the ODE.

2.2 Method of Integrating Factors

This is used to solve ODE's that can be put into the form

$$\frac{dy}{dt} + p(t) * y = g(t)$$

The chain rule can be written as: $\int (f'(x)g(x) + f(x)g'(x))dx = f(x)g(x)$

We can use an **integrating factor** equivalent to $e^{\int p(t)dt}$ to multiply both sides and arrive at a form that can be integrated with ease using the reverse chain rule.

Chapter 3

Systems of Two 1st Order DE's