

MATH 250 EXAM 1 REVIEW SHEET

Basic notion:

- Direction fields
- Classification
 - Linear vs. nonlinear
 - Order of an equation
 - Homogeneous vs. nonhomogeneous
 - Definition of solution to DE

First order equations:

- Linear equations with variable coefficients
 - Integrating factors
 - Limiting behaviour for different initial data
- Separable equations
 - Implicit form of solution
 - Explicit form of solution
- Word problems
 - Mixing problems and falling/rising body problems
 - Setup and solution of the initial value problem
 - Analysis of solution
- Linear vs. Nonlinear
 - Existence/uniqueness theorem for linear 1st order equations
 - Existence/uniqueness theorem for nonlinear 1st order equations
- Autonomous equations and asymptotic behavior
 - Graphs of solution and right hand side function
 - Classification of critical points
 - Asymptotic behaviour for different initial data

Second order equations:

- Existence/uniqueness theorem for linear 2nd order equations
- Linear homogeneous equations with constant coefficients
 - Formula for general solution in case of distinct roots
- Fundamental set of solutions, Wronskian
 - Definition of Wronskian
 - Concept of fundamental set of solutions of 2nd order linear ODE