Math 267 Review Sheet Fall2004@ISU:

1. First-order Differential Equations (Chapter 1-2)
   — Identify the types of equations (integrable eqs, separable eqs, linear eqs, exact eqs);
   — Substitution methods (homogeneous equation, Bernouli equation, \( y' = f(ax + by + c) \));

2. Linear Equations of Higher Order (Chapter 4)
   — Solution structure
   — Homogeneous equations with constant Coefficients
   — Variation of Parameters
   — Method of undetermined coefficients

3. Laplace Transform Methods (Chapter 5)
   — Definition of Laplace Transform & Inverse Transform
   — Transformation of Initial Value Problems
   — Some formulas and important properties
   — Solving initial value problem via Laplace Transform.

4*. Numerical methods (Chapter 6)
   — Euler’s method
   — Runge-Kutta Methods

5. Linear Systems of Differential Equation (Chapter 7-9)
   — Higher order equations & First-order systems;
   — The Method of Elimination for solving linear systems;
   — Matrix and Linear Systems;
   — Solution Structure of linear systems: \( x' = Ax + f(t) \);
   — The Eigenvalue Method for homogeneous Systems.
   — Variation of parameters for inhomogeneous system.

6*. Qualitative analysis of Systems (9.3, 9.6 + Chapter 10)
   — The linearization of a nonlinear system
   — Type and Stability of equilibrium points;
   — Phase plane analysis;