

## Topics for final exam, MATH308-FALL 2013

1. Topics covered in the previous tests that might be included in the final test:
  - (a) Section 2.2: Separable equations;
  - (b) Section 2.6: Exact equations and integrating factors;
2. Section 6.4: Impulse functions.
3. Topics that were not covered in the previous tests that might be included in the final test:
  - (a) part of section 7.5 related to the case when there are repeated roots but the basis of the eigenvectors exists.
  - (b) Section 7.7: Fundamental matrices: to know what is the fundamental matrix of a linear system; to know what is the exponential of the matrix and how it is related to the solution of IVP for linear systems with constant coefficients; to know to calculate exponential for diagonal matrices and for the Jordan blocks of size 2 and 3, i.e. the matrices  $\begin{pmatrix} \lambda & 1 \\ 0 & \lambda \end{pmatrix}$ ,  
 $\begin{pmatrix} \lambda & 1 & 0 \\ 0 & \lambda & 1 \\ 0 & 0 & \lambda \end{pmatrix}$ .
  - (c) Section 7.8: Linear systems of differential equations with constant coefficients and repeated eigenvalues (in the cases  $n = 2$  and  $n = 3$ ); In particular, you should understand the notion of the algebraic and geometric multiplicity of an eigenvalue discussed in class (see also page 380 of the text book);
  - (d) Section 7.9: Nonhomogeneous linear systems: method of variation of parameters;
  - (e) Section 9.1: The phase portrait: Linear systems: to know all types of critical (equilibrium) points, their stability property (see Table 9.1.1 on page 494 for the summary); also to know to sketch the corresponding phase portraits.

*It is recommended to review all problems in homework assignments (especially assignment 17-18 for the topics not covered by the previous tests) and the examples given during the class on the topics listed above*