Topics for final exam, MATH308-FALL 2012

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;

   (c) Sections 6.3: Laplace transform of the step functions

2. Topics that were not covered in the previous tests that might be included in the final test:

   (a) Section 7.6: Linear systems of differential equations with constant coefficients and complex eigenvalues (in the cases $n = 2$ and $n = 3$);

   (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 $\begin{pmatrix} \lambda & 1 \\ 0 & \lambda \end{pmatrix}$, $\begin{pmatrix} \lambda & 1 & 0 \\ 0 & \lambda & 1 \\ 0 & 0 & \lambda \end{pmatrix}$, ... or the block diagonal matrices with each diagonal block being a Jordan block of up to size 3, for example $\begin{pmatrix} \lambda_1 & 1 & 0 \\ 0 & \lambda_1 & 0 \\ 0 & 0 & \lambda_2 \end{pmatrix}$;

   (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 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 15-17 for the topics not covered by the previous tests) and the examples given during the class on the topics listed above and to attempt the additional suggested problems listed in the Class Announcements.*