Topics for exam 2, MATH308-SUMMER 2012

1. Chapter 3

   - Linear homogeneous equations of second order with constant coefficient in all possible cases (two distinct real roots, complex roots, repeated root) (sections 3.1, 3.3, and 3.4);

   - Method of reduction of order (section 3.4);

   - Linear non-homogeneous equations of second order: general solution via a particular solution and the general solutions of the corresponding homogeneous equation (section 3.5);

   - Method of undetermined coefficients (section 3.5)

   - Method of variation of parameters for linear non-homogeneous equations of 2nd order (sect. 3.6).

   - Spring-mass systems: undamped free vibration (including finding of the amplitude, the natural frequency, the period and the phase).

   - Spring-mass systems: damped free vibration, including finding of quasi-period and understanding the meaning of critical damping amplitude (the formula for the latter will be given).
     The last two items correspond to section 3.7.

   - Forced vibration (including finding of steady state solution and the frequency corresponding to the maximal amplitude of the solution if the amplitude of the external force is fixed, the formula for the latter will be given) (section 3.8).

2. Laplace Transform (Chapter 6, sections 6.1-6.5). The table of Laplace transform as in the page 317 of the textbook will be given. It is recommended to practice to use this table. Even more important is that you have to be aware that before using the table you will have to make an appropriate work based on the principles and techniques you learned. Please make sure to review them. Do not rely on the presence of the table. The table will be useless if you do not know appropriate principles and techniques.

   The main points to know for this goal are

   - how to transform a given linear differential equation with constant coefficients to an algebraic one using the Laplace transform (section 6.2).

   - how to find the inverse Laplace transform of a rational function using the partial fraction decomposition (section 6.2).

   - how to find the Laplace transform for a piecewise continuous function (with the help of steps functions, sections 6.3, 6.4) and for an impulse function (section 6.5)

   - how to apply the items above in order to solve initial value problems for non-homogeneous linear equations, including equations with discontinuous and impulse right hand side.

   It is *recommended to review all problems in homework assignments 7-13, the examples given during the class on the topics listed above and to attempt the additional suggested problems listed in the Class Announcements and the problems in homework assignments 4-6 and also part of assignment 7 (problems 1-4 there) of Spring 2012 term posted on on http://www.math.tamu.edu/ zelenko/308Hmwk.html*