

## Topics for final exam, MATH308-FALL 2015

1. Section 9.3: To know how to find critical points of a given nonlinear (but locally linear) system, how to find the linear system corresponding to each critical point, and how to determine the stability properties of the critical point on the base of the corresponding linear system (as in Table 9.3.1, page 523 of 10th edition of the textbook or in Table 9.3.1 of page 513 of 9th edition).
2. Method of variation of parameters for linear non-homogeneous system of equation of first order (section 7.9) and for linear non-homogeneous equations of 2nd order (sect. 3.6).
3. Method of undetermined coefficients for linear non-homogeneous equations of 2nd order (section 3.5).
4. Forced vibration (including finding of *steady state solution*) (section 3.8).
5. Laplace Transform (Chapter 6, sections 6.1-6.4 and 6.6). The table of Laplace transform as in page 321 of the 10th edition or in page 317 of the 9th edition 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)
- how to apply the items above in order to solve initial value problems for linear non-homogeneous equations (sections 6.2 and 6.4)
- how to use the convolution for finding inverse Laplace Transform and solution of IVP (section 6.6)

*It is recommended to review all problems in homework assignments 13-16 and the examples given during the class on the topics listed above. In addition, review the following problems in homework assignments of Spring 2015 term posted at <http://www.math.tamu.edu/zelenko/S15308Hmwk.html>: assignment 7 Problem 2, assignment 8 Problems 1 and 3, entire assignments 9 and 10, assignment 11 problems 2 and 3, assignment 16 problems 1 and 2, assignment 17 problem 2. You can also review the following problems in homework assignments of Fall 2013 term posted at <http://www.math.tamu.edu/zelenko/F13308Hmwk.html>: entire assignments 8 and 9, assignment 10 problem 2, entire assignments 11 and 12, assignment 13 problems 2 and 3.*