Topics for final exam, MATH308

The exam is cumulative. To prepare to the test you have to review all the material focusing on the topics below:

1. Section 2.1: Linear nonhomogeneous equations of first order: method of integrating factor;

2. Section 2.2: Separable equations;

3. Section 2.6: Exact equations and integrating factors;

4. Section 6.2: Solution of initial value problems that is reduced (via Laplace transform) to finding the inverse Laplace transform of rational functions with the help of partial fraction decomposition;

5. Sections 6.3 and 6.4: Step functions and Differential Equations with Discontinuous Forcing Functions;

6. Section 6.4: Impulse functions;

    Note that, as in the midterm exam 2, the table of Laplace transform as in the page 317 of the textbook will be given but you have to be aware that before using the table you will have to make an appropriate work based on the techniques you learned.

7. 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 matrices of the type $\begin{pmatrix} \lambda & 1 \\ 0 & \lambda \end{pmatrix}$

8. Section 7.8: Linear systems of differential equations with repeated eigenvalues (restricted to the case $n = 2$);

9. Section 7.9: Nonhomogeneous linear systems: method of variation of parameters;

10. 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.

11. Section 5.2 and 5.3: Series of solutions near an ordinary point:

    - to know how to determine weather a point is ordinary or singular for the given differential equation;
    - to know to find a recurrence relation for coefficients of series solution about the given ordinary point and to find given number of first terms of the generals solution or solution of IVP;
    - to know to determine the lower bound for the radius of convergence of series solutions about the given point.

It is recommended to review all problems in homework assignments and the examples given during the class on the topics listed above and to attempt the additional suggested problems listed in the Class Announcements.