

Topics for Exam 1, MATH308-Fall 2012

1. Direction field, autonomous equations, equilibrium points, analysis of behavior of solutions of autonomous differential equations when  $t \rightarrow +\infty$  or  $t \rightarrow -\infty$  on the base of the direction fields (equations of type considered in section 1.1 and section 2.5, see also homework #2);
2. Separable equations (section 2.2)
3. Linear nonhomogeneous equations of first order: method of integrating factor (section 2.1);
4. Modeling with first order differential equation (falling of a hailstone in the presence of an air resistance (section 1.2), mixing of a substance in a tank or in a pond, (section 2.3));
5. To know to determine an interval in which a solution of a linear nonhomogeneous differential equation of first order is certain to exist without solving the equation (section 2.4);
6. Exact equations and integrating factors (section 2.6);
7. Fundamental set of solutions of linear homogeneous equations of second order; the Wronskian (section 3.2);
8. Linear homogeneous equations of second order with constant coefficient in the case of two distinct real roots of characteristic polynomial (sections 3.1)

*It is recommended to review all problems in homework assignments 1-5; the examples given during the class on the topics listed above, the problems in homework assignments 1-6 of Summer 2012 term posted on <http://www.math.tamu.edu/zelenko/Su308Hmwk.html>; the problems in homework assignments 1-3 of Spring 2012 term posted on <http://www.math.tamu.edu/zelenko/308Hmwk.html>. Also attempt the additional suggested problems listed in the Class Announcements.*