Math 311 — Final Overview.

The following areas may be on the final:

(1) First order differential equations
   (a) Existence and Uniqueness
   (b) Slopefields, solution curves
   (c) Solving 1st order equations: separable, linear, substitution
   (d) autonomous equations, phase plots
   (e) population models: natural, logistics, with harvesting
   (f) acceleration-velocity models
(2) Higher order linear equations
   (a) Existence and Uniqueness
   (b) General solutions
   (c) linear equations with constant coefficients, homogeneous and non-homogeneous
   (d) spring models
(3) 2D Systems of Differential Equations
   (a) Solve $\mathbf{x}' = A\mathbf{x}$ where A is a 2×2 real matrix.
   (b) conversion between a 2nd order equation and a system of 1st order equations
   (c) Sketch phase portraits of these systems.
(4) Laplace Transforms
   (a) Calculate Laplace Transform of f from definition
   (b) Use Table of basic Laplace Transforms and combination rules (including partial fractions) to compute Laplace Transform.
   (c) Solve differential equations using a Laplace Transform.

The following will not be covered: Exact Equations, Numerical Methods, Nonlinear systems, Laplace Transform of Periodic Functions.