

Study guide for the final exam

Math 1241, Fall 2012

The final exam is a cumulative exam. It is based on all the material covered in the class, meaning the material listed for exam 1, exam 2, and exam 3, as well as sections 5.5-5.8 of the textbook and Math Insight, parts 26-28. Using the book sections as a guide, the following highlights what is and what is not good potential material for the final exam.

1. Material listed in the study guide for exam 1
2. Material listed in the study guide for exam 2
3. Material listed in the study guide for exam 3
4. Solving autonomous differential equations (section 5.4)

This topic is not part of this course.

5. Two-dimensional autonomous differential equations (sections 5.5, 5.6, and 5.7)

What it means for two autonomous differential equations to be coupled.

Estimating a solution to a two-dimensional differential equation using the Forward Euler algorithm

Understanding the correspondence between the phase plane plot and plots versus time.

Finding equilibria by solving the two equations made by setting the rates of change to zero.

Plotting nullclines in the phase plane.

Finding equilibria by finding the points where the nullclines intersect.

Plotting direction arrows on the nullclines and in the regions of the phase plane that are divided by the nullclines.

Sketching a solution in the phase plane based on direction arrows.

The predator-prey system, the competition equations, and the disease model are good example equations, but you aren't expected to memorize them.

6. The dynamics of a neuron (section 5.8)

The Fitzhugh-Nagumo model is a good example system of equations, but you aren't expected to memorize it.