

EXAM 1 INFORMATION

Math 230, Fall 2020

Exam 1 will consist of a few take-home questions, distributed on Friday, September 18 and due at the beginning of class on Monday, September 21, and an in-class exam on September 21. The exam will test your knowledge of concepts we have studied in this class, from Sections 1.1 – 2.3 in the textbook.

Take-Home

The take-home portion of the exam will contain a few problems similar to the homework problems in this course. For this part of the exam, you may use your textbook, your notes, materials on the course web site, and computational technology (e.g., calculator, *Mathematica*, and *Wolfram Alpha*). If you have question about the exam, you may ask the professor. **Do not consult other sources, people, web sites, etc.** The St. Olaf Honor Code applies to the take-home exam.

In-Class

The in-class portion of the exam will contain problems that are intended to be completed without technology. Books, notes, and internet-capable devices will not be permitted during the in-class exam. Calculators will be allowed, but probably not very useful, and certainly not necessary.

Concepts, Definitions, and Theorems

You should be able to define, illustrate, use, and briefly summarize the following:

- Ordinary differential equation
- First-order differential equation
- Equilibrium solution
- Initial condition
- Qualitative analysis
- General solution
- Particular solution
- First-order system of differential equations
- Autonomous differential equation
- Slope field
- Euler's method
- Existence Theorem
- Uniqueness Theorem
- Phase line
- Source, sink, and node
- Parameters (in a differential equation)
- Bifurcation
- Bifurcation diagram
- Homogenous differential equation
- Linear differential equation
- Linearity Principle
- Extended Linearity Principle
- Method of undetermined coefficients

- Integrating factor method
- Phase plane
- Phase portrait
- Equilibrium points
- Vector field
- Damped harmonic oscillator

Practice Problems

Consider any of the following problems for practice:

- Chapter 1 review (pages 136–141) #1–39, 41–46, 49, 51, 52
- Chapter 2 review (pages 224–226) #1–9, 11, 13, 14–28, 31–34