

EXAM 2 INFORMATION

Math 230, Fall 2020

Exam 2 will consist of a few take-home questions, distributed on Monday, October 19 and due at the beginning of class on Wednesday, October 21, and an in-class exam on October 21. The exam will test your knowledge of concepts we have studied in this class, from chapters 3 and 4 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:

- Harmonic oscillator
- Second-order linear differential equation
- System of linear differential equations
- Linearity Principle
- Linearly independent (vectors, solutions)
- Eigenvalues and eigenvectors
- Characteristic polynomial
- Straight-line solutions
- Phase portrait
- Equilibrium point (sink, source, saddle, spiral sink, spiral source, center)
- Trace-determinant plane
- Bifurcation
- Forced harmonic oscillator
- Homogeneous differential equation
- Extended Linearity Principle
- Steady-state solution
- Method of Undetermined Coefficients
- Resonance and beats

Practice Problems

Consider any of the following problems for practice:

- Chapter 3 review (pages 376–380) exercises 1–32.
- Chapter 4 review (pages 449–451) exercises 1–4, 10–12, 15–23