MA361
DIFFERENTIAL EQUATIONS
Instructor: Roxin Zhang
Meeting Time: MWF 11:00 – 11:50 pm, WS 1705
Text: A First Course in Differential Equations, 10th ed, by Denis Zill
Prerequisite: MA265 and MA211
Office Hours: MWRF 11 – 11:50 am
Software Used: Maple (Install Maple at your earliest convenience)
What is a differential equation?

- An equation involving functions and their derivatives.

**Example:**

The growth rate of a deer population is proportional to the population size at any time, namely,

\[ \frac{dP}{dt} = kP \]

where \( P = \) population size, \( t = \) time, \( k = \) a constant.

We would like to know how does the population change.
Another example, the rate of change of the temperature of a cup of coffee is proportional to the difference of the temperature of the medium and the temperature of the coffee:

\[
\frac{dT}{dt} = k(T_m - T)
\]

where \( T \) = temperature of the coffee, \( T_m \) = temperature of the medium, \( t \) = time, \( k \) = a constant.

We would like to know how is the temperature changing over time.
Contents

- Introduction to Differential Equations
- First Order Differential Equations
- Modeling with First Order Differential Equations
- Higher Order Differential Equations
- Series Solutions and the Laplace Transform
- System of Linear First Order Differential Equations
Homework and Tests

- Exercise problems will be assigned after each lecture. Students are expected to do the homework and participate in the discussions during the following lectures.

- There are three types of tests:
  - Quizzes - quizzes (in-class or take-home) will be given on a regular basis.
  - Midterm - Tentatively scheduled in the 7th week.
  - Final exam - A comprehensive exam + an essay. Wednesday, April 30, 12:00 - 1:50 pm.
Close to the end of the semester, students are required to **write and present** a formal essay on the applications of ordinary differential equations to solving real-world problems. Analyze and apply ordinary differential equation and its solution techniques in the context of an example.
Attendance will be checked randomly and will be calculated into the grade. Remember that the poor attendance is one of the primary causes of failing a class.

Grades are calculated as a weighted average of the quizzes, midterm, final exam and the attendance. The weights are: Assignments 50%, Midterm 20%, Final exam 25%, Attendance 5%.

Grading Convention:
A 95%, A- 90%, B+ 85%, B 80%, B- 75%, C+ 70%, C 65%, C- 60%, D+ 55% etc.
If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Disability Services Office by: coming into the office at 2001 C. B. Hedgcock; calling 227-1700; or e-mailing disserv@nmu.edu. Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.