Welcome to Calculus I
MATH 2554

- Please sit as close to the front as possible
- Please read the syllabus. It contains information that is both important and expected that you know.

Calculus I – The Big Picture

This course is about something!!

- At the foundation: FUNCTIONS.
- Key Concept: Rate of Change

Average over an interval	At an instant
Algebra	Calculus

- Key Concept: Accumulation Arithmetic $\longrightarrow_{\text{Limit}}$ Calculus (integral)
- Incredible Fact: These concepts are related!! The Fundamental Theorem of Calculus

Advice from Calculus Survivors:

1. Go to class!
2. Do all of the homework!
3. Do not wait until the last minute!
    - 3.1 MLP *will* crash
    - 3.2 You will not have time to ask questions
4. Don't fall behind!
5. Ask for help when you need it!
    - 5.1 Office hours
    - 5.2 Calculus Corner. See your syllabus for details!

Example An object is launched into the air and its position (in meters) at time t is given by the equation:

$$s(t) = -4.9t^2 + 30t + 20.$$

1. Compute the average velocity over the time intervals: $[1, 3]$, $[1, 2]$, $[1, 1.5]$.
2. As the interval gets shorter, what happens to the average velocities?
3. Can we use the average velocities to compute a "velocity" at $t = 1$?
4. What do the average velocities represent on the graph of $s(t)$?

Questions for Thought:

- Q: What happens to the relationship between instantaneous velocity and average velocity as the time interval gets shorter?
- A: The instantaneous velocity at $t = 1$ is the limit of the average velocities as t approaches 1.
- Q: What is the relationship between the secant lines and the tangent lines as the time interval gets shorter?
- A: The slope of the tangent line at $(1, 45.1)$ is the limit of the slopes of the secant lines as t approaches 1.

Homework Problems: Section 2.1 (pp.61-62): #1-6,16,19,21,30.