Welcome to Math 190: Calculus Survey

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- Office: Math Building 229A
- Office hours and location:
  - TBD in class on Friday.
- Common course page: on Canvas:

  https://canvas.ubc.ca/courses/5923

- Section webpage:

  https://blogs.ubc.ca/math190s101/

* Do my best to update both pages weekly, but Canvas page should be the main source of course content.

- Textbook: No required textbook. Check the course page for the suggested textbooks for your extra practice.

Course Grading

- Quizzes 15%
- Homework + iClickers 10%
- Labs 5% (Begin next week)
- Midterm 20% (set for October 29, NO make-up exam)
- Final exam 50%

Homework and WebWork

- **Labs:** weekly and mandatory. Problem solving sessions, run by TAs. They begin next week.
- **Quizzes:** bi-weekly (except the midterm week). Unless you have well-documented reasons, missed Quizzes will be given a grade of 0. No make-up Quiz.
- **Homework:** Written homework on the weeks when there is no quiz. They are collected at the beginning of class on the due date. Late assignments will not be accepted.
- **iClickers:** The credit is for participation only and not for the correct response. Please make sure you have them in every class, and they are set to the correct frequency. (BA)
- Please check Canvas course page or the webpage for the details of the course outline.

Welcome to MATH 190

Calculus Survey

We survey the basic topics in Calculus.

Calculus

Differential Calc (MATH 100, 180, 184, ...)

Integral Calc (MATH 101, 103, 105 ...)

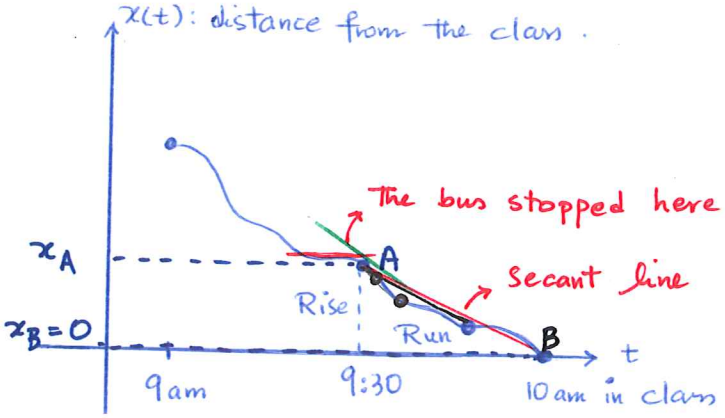
A collection of topics in Both differential and Integral Calc

MATH 190

Part 1: What is differential Calculus about?

It's about rate of change in physical quantities:

Example: Suppose you leave home at 9 am to get the bus and arrive in class at 10 am. Your distance from home to school is given by the following graph:



Question 1 : What is your average velocity (speed) between points A (9:30) and B (10:00) ?

$$V_{average} = \frac{\text{change in distance}}{\text{change in time}} = \frac{x_B - x_A}{t_B - t_A} = \frac{\Delta x}{\Delta t}$$

Notation : In mathematical language, Δ (delta), is used to represent change in some quantity.

Connect points A and B to get a line, what is the name of this line ? Secant line (any line that passes through two points

Question 2 : How can we relate V_{ave} to the secant line ?

Slope of the secant line is exactly the average velocity.

$$\text{Slope of } AB = \frac{\text{Rise}}{\text{Run}} = \frac{\text{change in } x}{\text{change in } t}$$

Question 3 : If we move point B on the graph and make it get closer and closer to A, How would the secant line change ? As B gets closer to A, it looks as if the secant line is only touching the graph at one point which is A $\rightsquigarrow$ This line is the tangent line to the graph at A.

$\Longrightarrow$ The average velocity is changing to instantaneous velocity

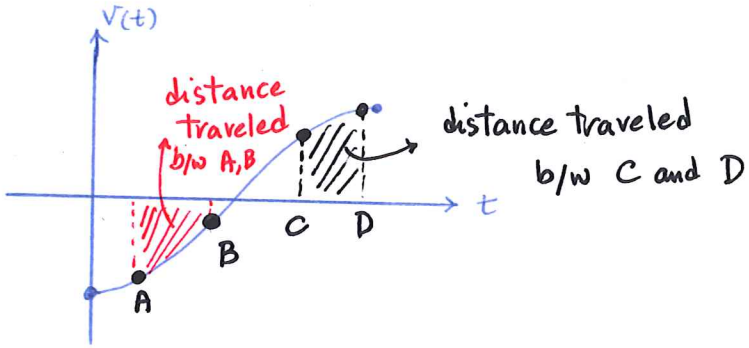
Velocity at one moment (9:30)

This example describes the building blocks of differential calculus. We'll see later in the course that how the tangent line is closely related to the derivative and the derivative is the core of differential Calculus.

Part 2 : What is Integral Calculus about ?

One can say that, Integral Calc is about anti-derivatives, so it must be closely related to differential Calc.

Let's now assume the graph of velocity is given at each moment:



If I ask you, what distance has been traveled between A and B, the formula $\frac{\text{Rise}}{\text{Run}}$ is no longer working, this a velocity graph ⟶ Integral Calc works here

⟶ We'll see that the distance will be the area under the graph and integral calc will tell us how to find that area.

One main application of Integral Calculus and in particular integrals is to find the area inscribed by a graph.