

# Math 105: Multivariable Calculus

## First Lecture (2/4/11)

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## Introduction and Objectives

## Introduction

- Building block course.
- Study how things change / modeling.
- Learn material **and techniques**.
- General math skills:
  - ◇ Good notation.
  - ◇ Asking right questions (see motivation clip).
  - ◇ Common techniques.
  - ◇ Brute force vs. elegance.
  - ◇ Building intuition / special cases.

## Extra Credit Problem (due 2/11/11)

Assume team  $A$  wins  $p$  percent of their games, and team  $B$  wins  $q$  percent of their games. Which formula do you think does a good job of predicting the probability that team  $A$  beats team  $B$ ? Why?

$$\frac{p + pq}{p + q + 2pq},$$

$$\frac{p + pq}{p + q - 2pq}$$

$$\frac{p - pq}{p + q + 2pq},$$

$$\frac{p - pq}{p + q - 2pq}$$

## Types of problems

- **Physics:** Forces, Newton's laws, partial differential eqs, ....
- **Economics:** Optimization, ....
- **Finance:** Monte-Carlo techniques (dartboard), ....
- **Geometry / Probability:** Areas / volumes, ....
- **Approximation Theory:** Everything!
  - ◇ Discovery of Neptune.
  - ◇ Library trip.

## Course Mechanics

- **Pace:** faster than 104, learn by doing / daily HW.
- **Food / Cell phones:** Food okay, hearing cell-phones isn't.
- **Preparation: Read material before class: 5% of grade.**
- **Supplemental lectures:** 12 weeks vs 15 weeks.
- **Office hours:**
  - ◇ Strongly urge to visit.
  - ◇ Strongly urge to go to TAs.

## Grading (Controlling your education)

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HW 15%, Midterms 40% (best 2 of 3 or best 1 of 2), Final 45%.

**Reading option:** Replace 5% (can miss two, honor code).

**Scribe option:** Replaces 5%.

**Quiz option:** Replace 5%.

**Project option:** Replace 5%.

Can do two for 10%, three for 15, four for 20%.