MAT137 - Calculus with proofs

- Test 2 opens on FRIDAY, December 4
- Assignment #5 due on December 20

- TODAY: Optimization

- NEXT: Indeterminate forms and L'Hôpital's Rule
  - **Watch videos: 6.6, 6.7, 6.9**
  - Supplementary videos: 6.5, 6.8

The classic farmer problem

A farmer has $300m$ of fencing and wants to fence off a rectangular field and add an extra fence that divides the rectangular area in two equal parts down the middle. What is the largest area that the field can have?

Distance

Find the point on the parabola $y^2 = 2x$ that is closest to the point $(1, 4)$.

A matter of perspective

A painting in an art gallery has height h and is hung so that its lower edge is a distance a above your eye. How far from the wall should you stand to get the best view?

Dominion

Dominion is a board game where, among other things, players buy cards worth victory points. The player with the most victory points wins.

It is your last turn and you can only buy "duchies" and "dukes". A duchy is worth 3 victory points. A duke is worth as many victory points as duchies you have. Each duchy costs 3 coins, and each duke costs 3 coins. You have not bough any duke or duchy yet.

If you have $3N$ coins, how many dukes and how many duchies should you buy?

Fire

You hear a scream. You turn around and you see Alfonso is on fire. Literally! Luckily, you are next to a straight river. Alfonso is 10 meters away from the river and you are 5 meters away from the point P on the river closest to Alfonso. You are carrying an empty bucket. You can run twice as fast with an empty bucket as you can run with a full bucket. How far from the point P should you fill your bucket in order to get to Alfonso with a bucket full of water as fast as possible?