3 optimization problems

3. 1 Higher order derivatives, Velocity and acceleration

- be able to determine first and second derivatives of functions
  - where s(t) is position at t
  - v(t) or $\frac{ds}{dt}$ is velocity at time t
  - a(t) or $\frac{d^2s}{dt^2}$ is acceleration at time t
- be able to to determine when velocity is 0 by setting the velocity of function to 0
- when it is going in the + or - direction
- sub in values into our position velocity and time functions
- solve for one when you have the other (velocity is 12 find position)
- when the particle changes directions (at the zeros) be able to represent on a number line
- graph on a horizontal line
- graph on an actual 2d chart

3.2 Max and Minimum Values on Interval

- extreme values occur on a function where the slope is zero or at the end of the define range
  - a local maximum or min is a max or min defined by a velocity of 0
  - an absolute max or min is the max or min of a function over a given interval -** if a function is not continuous** then those discontinuous points must be checked as max's or mins (additionally there is no max or min with asymptotes
- be able to solve for local max or min by setting the derivative to 0
- be able to discriminate answers out of the range of the function given
- must determine the direction of the asymptotes by looking at points on either side in order to decide if there is no min max or both

Optimization I

- maximizing area of a rectangle
- maximizing area of a net
- **minimizing the surface area of a 3d shape** DO THIS QUESTION

Optimization II

- time distance problems

- relate speed in kt terms ($15t$)

- **the largest rectangle that can be inscribed inside a circle**
- **minimum distance from a point to a line through optimiziation and finding a normal equation**

Optimization econ

- $p(x)$ gives a price at which to sell a product given the number of products made in order to sell all of the products (is called a demand function because it is the max price that that many products can be sold for)
- being comfortable with $R(x)$ $C(x)$ and $P(x)$
- being able to optimize for any of the functions listed above
- using the line equaton to solve for a price function then subsequently a revenue function
- this works because we know the rate at which the price changes for a number of products, and a point on the curve. By multiplying this number by the number of products sold you can calculate revenue, then subsequently deriving that you can optimize for revenue.
- additionally optimizng for profit is similar to the process above but solf for profit then derive

Optimization econ II

- **solving for a cost function of a car,**
- optimizing for cost functions with variable cost sides (soccer posts ...) these I feel like I understand