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## Agenda

- LP reformulation
- Portfolio least squares
- Questions

## Logistics

Friend 006

• Midterm Thursday 1:30 - 2:50 (ODS will start at 12:30)

• 1 page cheat sheet

• Up to lecture 9 on

– Not including equivalence theorem

or anything on extreme points/vertices/basic feasible solutions

Formulate the following problem as an LP

$$\min_x \sum_{i=1}^n \max(0, a_i^T x + b_i)$$

## Portfolio Problem

- Current portfolio:  $h^{\text{curr}}$  ← amount invested in  $n$  assets
- Current Total value is  $\mathbb{1}^T h^{\text{curr}}$

- $h - h^{\text{curr}}$  is the trade vector

- $n$  assets divided into  $m$  industry sectors

- $s \in \mathbb{R}^m$  denotes the dollar value sector exposure

$$s = Sh \quad S \in \mathbb{R}^{m,n} \quad S_{ij} = \begin{cases} 1 & \text{if asset } j \text{ in sector } i \\ 0 & \text{else} \end{cases}$$

- New portfolio must have a given sector exposure  $s^{\text{des}}$

- Minimize the trading cost, given by

$$\sum_{i=1}^n K_i (h_i - h_i^{\text{curr}})^2 \quad (K_i > 0)$$

- Explain how to find  $h$  using constrained least squares

- Suppose you want to include a penalty on shorting assets.  
How might you include this as a linear constraint?