


Precept 2

Agenda

- Ballistics example
- Inverse of matrix w/ LU
- More plotting

Logistics

- Change in rotation of preceptors - I'll be here 2 out of every 3 weeks
 - Hao will take the 3rd week
- HW1 out, due Friday Feb 12 at 9pm
- HW2 out Thursday, due Friday Feb 19 at 9pm

Ballistics Example

Overview

- a projectile moving in 2-dim space
- sample position and velocity at times $\tau = 0, h, 2h, \dots$
- $p_+ \in \mathbb{R}^2$ is the position at time $\tau = th$
- $v_+ \in \mathbb{R}^2$ is the velocity at time $\tau = th$
- $f_+ \in \mathbb{R}^2$ is the total force on projectile at time $\tau = th$
- $x_+ = \begin{pmatrix} p_+ \\ v_+ \end{pmatrix}$ is the projectile state at time $\tau = th$

Force model

- $f_+ = mg - \eta v_+$
- $\eta \in \mathbb{R}$ is the drag coefficient
- $g = \begin{pmatrix} 0 \\ -9.8 \end{pmatrix}$ is gravity

Dynamics

- approximate velocity as constant over time interval $th \leq t \leq (t+1)h$
- approximating force as constant over the time interval

Now write this more compactly as

Propagating the state through time

Robust ballistics

- Suppose we have uncertainty in the drag coefficient
- uncertainty modeled as K scenarios
 - each scenario has its own

Robust targetting