Slide 1

Administrivia

- Homework 7 due date extended to Friday.
- Reminder: Quiz 6 Wednesday.

Slide 2

Minute Essay From Last Lecture

- Questions:
  - Which of the following functions are $O(N^2)$?
    $f(N) = 100N^2$
    $g(N) = N^2 + N - 1000$
    $h(N) = N^3$
  - Which of the following functions are $O(2^N)$?
    $f(N) = 2^N - 5$
    $g(N) = 10^N$
    $h(N) = N!$
- Answers?

Slide 3

Matrices — Definitions and Terminology

- Informal definition — rectangular 2D grid. Could use to represent binary relation, system of linear equations, etc.
- Terminology:
  - Dimensions and indexing.
  - Diagonal matrix.
  - Symmetric matrix.
  - Matrix transpose (A^T).

Slide 4

Operations on Matrices

- Operations defined so that matrices will be useful for representing "linear transformations" (from one 2D space to another).
- Addition, subtraction, scalar multiplication fairly obvious/straightforward — apply operations elementwise. (What does this imply about the dimensions of the matrices involved?)
- Matrix multiplication somewhat less straightforward — element (i, j) of $A \cdot B$ is the "inner product" of row i of A and column j of B — multiply corresponding elements and sum up results. (What does this imply about the dimensions of the matrices involved?)
- Matrix inverse A^{-1} is matrix that when multiplied by A gives identity matrix.

Slide 5

Matrices and Systems of Linear Equations

- Matrices can be used to represent/solve systems of linear equations. See problems 14, 15.

Slide 6

Minute Essay

- Given A and B as follows, compute $A \cdot B$:

$$A = \begin{bmatrix} 2 & -1 & 0 \\ 5 & 1 & 6 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$