

## October 20

### Announcements

- Midterm 1 scores are out
- Median is a 51, Mean is a 48
- Grade approximations will be released this weekend
- Webassign 3.2, 3.3 due next Thursday
- Everyone gets credit for worksheet 3
- Worksheet 4 posted tonight

### 3.2 Matrix Algebra

#### Addition and scale multiplication

We can add and scale multiply matrices by pretending they are vectors. This has all the nice properties vectors have. See 3.11 in the book.

#### Matrix multiplication

Let  $A$  be an  $n \times k$  matrix and  $B = [b_1 \ b_2 \ \dots \ b_m]$  be a  $k \times m$ . We define the product  $AB = [Ab_1 \ Ab_2 \ \dots \ Ab_m]$  which is an  $n \times m$  matrix.

Do an example in class.

The identity matrix is a thing. Here it is.

#### Properties of Matrix Algebra

- $A(BC) = (AB)C$
- $A(B + C) = AB + AC$
- $(A + B)C = AC + BC$
- $s(AB) = (sA)B = A(sB)$
- $AI = A$
- $IA = A$

The key thing to know is that  $AB \neq BA$  and that  $AB = 0$  does not imply  $A = 0$  or  $B = 0$ .

Matrix multiplication are important because they correspond to composition of linear functions. Do example in class. Write this as a theorem?

#### Transpose are a thing

You flip the rows and columns. The key things to know are

- $(A + B)^t$
- $(sA)^t = sA^t$
- $(AC)^t = C^t A^t$

**Diagonal matrices are a thing**

**Elementary matrices are a thing**

Elementary matrices are the matrices that correspond to elementary row operations. Figure them out with class. It'll be fun.

**Block multiplication**

They are a thing. You feel great when you get it to work.