## **Day 2**

Recap Day 1

* HW Review - Walkthrough the HW solutions notebook (this will also be given to the students after lecture today)
  + Take any questions about the HW or whatever else
* Recap Day 1

What is a Vector - until the “Doing all of this with Code” slide, everything should be done by hand - on whiteboard/pen and paper

* Vectors as Lists - example is color as RGB (this will be talked about more later)
* Going in between these views - how to convert from an arrow to a list, and vice versa (for low enough dimensions)
  + Stress the value in this, a large reason for using vectors is because of this “translatative” property
* Adding Vectors
  + Walk through how to add arrows (head to tail) and how to add lists of numbers
  + Practice Problems for them:
    - Add the vectors [-2 -1] and [-3 4] both as arrows and lists
    - Add the vectors [3 2] and [1 2] both as arrows and lists
  + Give them some time and then walkthrough the practice problems
* Scaling Vectors
  + Walk through how to scale vectors and lists of numbers
  + Practice Problems
    - Scale the vector [-6 3] by ⅓ both as an arrow and a list
    - Scale the vector [3 2] by 3 both as an arrow and a list
  + Give them some time and then walkthrough the practice problems
* Dot Product - mention that computing the dot product with arrows is a bit more involved, but the directionality thing is nice
  + Practice Problems
    - [3 4 5] dotted with [1 2 3] - Answer is 26
  + Give them some time and then walkthrough the practice problem

What is a Matrix

* Matrices - mention how there are a lot of different views of matrices - generally they are a 2D grid of values
* Adding and Scaling Matrices
  + Practice Problems
    - Add the matrix [4 2, -3 10] to [-5 6, 2 -8] - answer is [-1 8, -1 2]
    - Scale the matrix [4 2, -3 10] by 2 - answer is
    - [8 4, -6 20]
* Matrix-Vector Multiplication - nothing on the slide for this one, walk through [0 3, -4 2] @ [-1 4] on the board
  + Practice Problem
    - [1 2 3, 4 5 6] @ [3 4 5]
  + Note how for an n-dimensional vector, matrix-vector multiplication will only work if the matrix has n columns

Doing all of this Code

* Until the Color section in the notebook, walkthrough the notebook - when there is fill in the blank stuff give them some time to work

Look at slides for rest of lecture

10 Min Break

Mini Projects

* Same idea as before - goal is for students to figure out how to do everything by themselves

Intro to Convolution

* Watch vid until 13:42 (the measuring runtime section)

Homework

* Homework will be a fill in the blank notebook for certain image filters