# CS 1.2: Intro to Data Structures & Algorithms

## Histogram & Markov Chain Worksheet

Name: Chris Wood

**Text:** *"I like dogs and you like dogs. I like cats but you hate cats."* (ignore all punctuation)

### Histograms

**Q1:** How many distinct word *types* are present in this input text? How many total word *tokens*?

Distinct word types: 8 Total word tokens: 14

**Q2:** What data structure would be appropriate to store a histogram counting *word frequency*?
Why did you choose this data structure? In other words, what makes this data structure ideal?

Dictionary because it allows only unique keys, it is easy to edit the value of a key to count number of instances of a word.

**Q3:** Write the data structure you would create to store this histogram counting *word frequency* (as it would look if you printed it out with Python).

{"I":2, "like":3, "and":1, "you":2, "dogs":2, "cats":2, "but":1, "hate":1}

### Markov Chains

**Q4:** Draw a conceptual diagram of the *Markov chain* generated from analyzing the text above. Label each *state transition arc* with the count of how many times you observed that word pair.

**Q5:** Write the data structure you would create to store the word transitions out of the state that represents the word "*like*" in this Markov chain (as it would look if you printed it out with Python).

**Q6:** Write a *new sentence* that can be *generated* by doing a *random walk* on this Markov chain.