LARSON—MATH 255–CLASSROOM WORKSHEET 14
Dictionaries and Problems

1. (a) Start the Chrome browser.

    (b) Go to `http://cocalc.com`

    (c) You should see an existing Project for our class. Click on that.

    (d) Click "New", then "Sage Worksheet", then call it **c14**.

    (e) For each problem number, label it in theSAGE cell where the work is. So for Problem 1, the first line of the cell should be `#Problem 1`.

Dictionaries

A dictionary is a collection of key-value pairs (*keys* and *values*). Each pair is connected with a colon, and different pairs are separated by commas.

2. Here is a dictionary of name-age pairs: `my_dictionary={"Kyrie":30,"Cindy":23}`. Evaluate. Now evaluate `my_dictionary`.

3. To find Kyrie's age, evaluate `my_dictionary["Kyrie"]`. Now find Cindy's birthday.

4. To get a list of all the *keys* use the `.keys()` method. Evaluate: `my_dictionary.keys()`.

5. And to get all the *values*, use the `.values()` method. Evaluate: `my_dictionary.values()`.

Back to Randint

It is often useful to generate **random integers**. It only makes sense to generate random integers from within some range of integers. We do this with `randint()`.

6. **Investigate**. Does `randint()` produce a *uniform distribution*? (That is, as you repeat experiments of `randint(a,b)` are the number of produced outcomes of each possible integer roughly the same? Do some experiments! Keep track of the data with a dictionary!

7. **Problem.** Find the sum of the *even* Fibonacci numbers that are no more than four million.

Streaks of Heads and Tails

8. We would now like to investigate longest streak of heads or tails in a sequence of coin flips. We will first need to generate data. Write a function `coin_flips(n)` that *returns* a list of n "heads" or tails". Test your function.

9. Let `flip_data = coin_flips(100)`.

10. One way to investigate our data it it to first find the length of the streak that starts at any specified index in your `flip_data` list. Define a function `streak_at_i(flip_data,i)` that inputs a list of 'H' and 'T' strings, an index i, and returns the length of the streak whose first term is `flip_data[i]`. Test it on some data to see if its working.

11. Now we have a tool we can to a longest streak of heads or tails in our data. Use `streak_at_i(flip_data,i)` for $i \in [0..99]$ and keep track of the largest value you get.

A Formula for Primes?

12. When $n = 0$, $n^2 - 79n + 1601$ is 1601—which is prime. When $n = 1$, $n^2 - 79n + 1601$ is 1523—which is prime. Find the smallest value of n where $n^2 - 79n + 1601$ is *not* prime.

Getting your classwork recorded

When you are done, before you leave class...

(a) Click the "Make pdf" (Adobe symbol) icon and make a pdf of this worksheet. (If CoCalc hangs, click the printer icon, then "Open", then print or make a pdf using your browser).

(b) Send me an email with an informative header like "Math 255 - c14 worksheet attached" (so that it will be properly recorded).

(c) Remember to attach today's classroom worksheet!