LARSON—MATH 255–CLASSROOM WORKSHEET 19
Problems & Files

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 **c19**.
   (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`.

   Reading in, and working with, data files is an important ability. We created a data file (`one_hundred_numbers.txt`), learned how to read it in line-by-line, and work with the data. An important thing to know/note is that a file is actually a big *string*. You can read the lines of a file with `readline()`. Those lines are also strings (and not numbers - despite how they look). If you want numbers they must be converted to numbers.

   Homework Problems

2. What is the index of the first term in the Fibonacci sequence to contain 1000 digits?

3. Find the smallest sum $x + y + z$ with integers $x > y > z > 0$ such that $x + y$, $x - y$, $x + z$, $x - z$, $y + z$, $y - z$ are all perfect squares.

   Working with Files

   Reading in, and working with, data files is an important ability. We created a data file (`one_hundred_numbers.txt`), learned how to read it in line-by-line, and work with the data. An important thing to know/note is that a file is actually a big *string*. You can read the lines of a file with `readline()`. Those lines are also strings (and not numbers - despite how they look). If you want numbers they must be converted to numbers.

4. Use `open` to create a file "primes.txt" and write the first one hundred primes to that file, one per line, and close the file. Remember to check if your file exists and has the data you expect!

5. Here's **a multi-step problem that builds on what we did**. Create a new file `two_hundred_numbers.txt` that consists of each line from `one_hundred_numbers.txt` written twice. (If you don't have `one_hundred_numbers.txt` In put a copy in your CoCalc Project Handouts fold).

Problems

6. The sum of the reciprocals of the positive integers

$$\sum_{n=1}^{\infty} \frac{1}{n}$$

diverges (that is, the sum goes to infinity).

   (a) Find the smallest integer m so that $\sum_{n=1}^{m} \frac{1}{n}$ is at least 2.
   (b) Find the smallest integer m so that $\sum_{n=1}^{m} \frac{1}{n}$ is at least 3.
   (c) Find the smallest integer m so that $\sum_{n=1}^{m} \frac{1}{n}$ is at least 4.

Getting your classwork recorded

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

1. 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).
2. Send me an email with an informative header like "Math 255 - c19 worksheet attached" (so that it will be properly recorded).
3. Remember to attach today's classroom worksheet!