LARSON—MATH 255–CLASSROOM WORKSHEET 39
Problems

1. (a) Start the Chrome browser.
   (b) Go to `http://cocalc.com`
   (c) Login using **your VCU email address** .
   (d) Click on our class Project.
   (e) Click "New", then "Worksheets", then call it **c39**.
   (f) For each problem number, label it in the Sage cell where the work is. So for Problem 2, the first line of the cell should be `#Problem 2`.

The Birthday Problem.

2. (Guess) **How many students do we need in a classroom so that there is a better than 50% chance that at least one pair of them have the same birthday (Month & Day)?**

3. What could you code to investigate this problem?

Problems

4. A Pythagorean triplet is a set of three natural numbers, $a < b < c$, for which, $a^2 + b^2 = c^2$, For example, $3^2 + 4^2 = 9 + 16 = 25 = 5^2$. There exists exactly one Pythagorean triplet for which $a + b + c = 1000$. **Find** the product abc.

5. The sum of the squares of the first ten natural numbers is, $1^2 + 2^2 + \ldots + 10^2 = 385$.

   The square of the sum of the first ten natural numbers is, $(1 + 2 + \ldots + 10)^2 = 55^2 = 3025$.

   Hence the difference between the sum of the squares of the first ten natural numbers and the square of the sum is $3025 - 385 = 2640$.

   Find the difference between the sum of the squares of the first one hundred natural numbers and the square of the sum.

6. (Ramanujan revisited) We found that 1729 is the smallest number which is the sum of 2 cubes in 2 different ways ($1729 = 1^3 + 12^3 = 9^3 + 10^3$). Find the smallest integer which can be written as the sum of 2 *squares* in 2 different ways.

7. Find the sum of the digits in the number 100!

8. Write a program `digit_of_e(n)` that outputs the n^{th} decimal digit of e.

9. The number, 197, is called a *circular prime* because all rotations of the digits: 197, 971, and 719, are themselves prime. There are thirteen such primes below 100: 2, 3, 5, 7, 11, 13, 17, 31, 37, 71, 73, 79, and 97. **How many** circular primes are there below one million?

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 - c39 worksheet attached" (so that it will be properly recorded).

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