

Last name _____

First name _____

LARSON—MATH 353—CLASSROOM WORKSHEET 05
Getting Started—Monty Hall Paradox.

1. Log in to CoCalc.
 - (a) Start the Chrome browser.
 - (b) Go to `https://cocalc.com`
 - (c) Login (**your VCU email address** is probably your username).
 - (d) You should see an existing Project for our class. Click on that.
 - (e) Click “New”, then “Worksheets”, then call it **c05**.

2. **A problem to think about: the Monty Hall Paradox.** There are 3 doors to choose from (on say a game show). There is a car behind one door and a goat behind each of the other two. You choose one door (say, Door 1). Maybe it has the car behind it (or maybe not)? At least one of the other doors has a goat behind it—and one of these doors is opened (say, Door 2). You are then given an opportunity to switch your choice of door (in this example, you could switch from Door 1 to Door 3). Should you?

How can you investigate this question experimentally?

3. Solve $x^2 - 1 = 0$ by evaluating `solve(x**2-1,x)`

4. Solve $x^2 + x = 25$.

5. Find all solutions of $\sin \theta = \frac{1}{2}$ by hand. Now try `solve(sin(x)-.5,x)`. Explain Sage’s result.

6. Define variables a , b and c . Solve $ax^2 + bx + c = 0$.

7. Draw the graphs of the following equations by hand. Find the solutions by hand.
$$\begin{cases} x^2 + y^2 = 4 \\ y = x + 1 \end{cases}$$

Now use `solve()` to find the intersection points of the graphs of this system of equations. First use the Help by typing `help(solve)`.

8. Consider the system:
$$\begin{cases} 2x + y = 20 \\ -x + y = 0 \end{cases}$$

Sketch the graphs of these lines on the same coordinate system, then solve to get the exact point of intersection.

9. Sketch the graph of $f(x) = x^5 + x^4 + x^3 - x^2 + x - 1$. Find the root (zero) of this function: `find_root(x5 + x4 + x3 - x2 + x - 1, -1, 1)`. Now try `find_root(x5 + x4 + x3 - x2 + x - 1, -1, 0)`. Explain the result.

10. Type in the following program and evaluate.

```
def write_string(string_name):  
    print(string_name)
```

Now type `write_string("hello world!")` and evaluate.

11. **Extra: Learn more Python!** If you have extra classtime, use it to learn more Python. Go to Codecademy ([codecademy.com](https://www.codecademy.com)), sign up for a free account, and do the *Learn Python 2* tutorial <https://www.codecademy.com/learn/learn-python>. (This one is totally free—and useful.)

12. Getting your classwork recorded

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

- 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).
- Send me an email with an informative header like “Math 353—c05 worksheet attached” (so that it will be properly recorded).
- Remember to attach today’s classroom worksheet!