

Last name _____

First name _____

LARSON—MATH 255—CLASSROOM WORKSHEET 03
Getting Started.

1. Create a Cocalc/Sage Cloud account.
 - (a) Start the Chrome browser.
 - (b) Go to <http://cocalc.com>
 - (c) “Create new account” using **your VCU email address** .
 - (d) You should see an existing Project for our class. Click on that.
 - (e) Click “New”, then “Sage Worksheet”, then call it **c03**.
 - (f) For each problem number, label it in the SAGE cell where the work is. So for Problem 1, the first line of the cell should be **#Problem 1**.

Review

- The multiplication operator in SAGE is “*”. The most common error in SAGE is forgetting to put in a “*” when multiplying.
 - produces *exact* answers. You often have to *force* SAGE to give you a decimal approximation of what you’ve calculated.
 - log in SAGE is the *natural log* (it *is* possible to compute logs in *any* base though).
 - Angles in SAGE are assumed to be in radians (angles in degrees must be converted to radian measure).
 - plot is SAGE’s powerful and flexible command for plotting functions of a single variable.
2. Sketch the graph of x^3 on the interval $(-2, 2)$.
 3. Sketch the graph of $|x - 1|$ on a “nice” interval.
 4. Sketch $\cos x$.
 5. Sketch $\cos t$. What happens? What do you think the difference is?
 6. Sketch $\cos x$ on the interval $(-2\pi, 2\pi)$.
 7. Sketch $x^3 - x$ with y -range between $y = -6$ and $y = 6$.
 8. Sketch x^2 and x^4 on the interval $(-2, 2)$.

9. Define a function $f(x) = x^3 - x$ by evaluating `f(x)=x**3-x`. Then find $f(1)$, $f(100)$. Evaluate `plot(f,-2,2)` and `plot(f(x),-2,2)` and `plot(f)`.
10. Define a constant $c = \frac{27}{14}$ by evaluating `c=27/14`. Find $f(c)$.
11. Define a new variable “ y ” by evaluating `var("y")`. Now sketch $g(x, y) = x^2 + y^2 - 2$ for $-1 \leq x \leq 1$ and $-1 \leq y \leq 1$ by evaluating `g(x,y)=x**2+y**2-2` and then `plot3d(g(x,y), (x,-1,1), (y,-1,1))`.
12. Solve $x^2 - 1 = 0$ by evaluating `solve(x**2-1,x)`.
13. Solve $x^2 + 1 = 0$.
14. Solve $x^2 + x = 25$.
15. Find all solutions of $\sin \theta = \frac{1}{2}$ by hand. Now evaluate `solve(sin(x)-.5,x)`. Explain SAGE’s result.
16. Define variables a , b and c . One way to do this is with the command `var("a b c")`. Solve $ax^2 + bx + c = 0$ by evaluating `solve(a*x**2+b*x+c, x)`.
17. 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)`.

18. Consider the following system. Sketch the graphs of these lines on the same coordinate system (by hand and then with `plot`), then `solve` to get the exact point of intersection.
$$\begin{cases} 2x + y = 20 \\ -x + y = 0 \end{cases}$$

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 - c03 worksheet attached” (so that it will be properly recorded).
- (c) Remember to attach today’s classroom worksheet!