

Last name _____

First name _____

LARSON—MATH 255—CLASSROOM WORKSHEET 8
Control.

1. Log in to your Sage/Cocalc account.
 - (a) Start the Chrome browser.
 - (b) Go to `http://cocalc.com` and sign in.
 - (c) You should see an existing Project for our class. Click on that.
 - (d) Click “New”, call it **c08**, then click “Sage Worksheet”.
 - (e) 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**.

2. **Warm-ups.** What will the following commands return in Sage? Answer and then use Sage to check.

- (a) `is_prime(245); is_prime(23)`
- (b) `even = lambda x: x%2==0; even(6); even(7)`
- (c) `L=[2..10]; len(L)`
- (d) `[k**2 for k in L]`
- (e) `n=6`
`if n<7:`
`print "{} is less than 7".format(n)`
- (f) `n=6`
`if n<5:`
`print "{} is less than 7".format(n)`
- (g) `i=0`
`while i<7:`
`print i`
`i=i+1`

3. **Matrices Review.** Consider the system:
$$\begin{cases} 9a + 3b + 1c = 32 \\ 4a + 2b + 1c = 15 \\ 1a + 1b + 1c = 6 \end{cases}$$
 Find a matrix that represents this system, find the row-reduced echelon form of this matrix, rewrite this as an equivalent system of linear equations and interpret.

4. **Programming.** What will the following code do?

```
def mystery1(n):
    L=[1..n]
    even = lambda x: x%2==0
    print [even(k) for k in L]
mystery1(9)
```

A *while loop* runs a block of code while a condition is still satisfied. A common way to use a while loop is in a test where you don't know precisely when the test condition will be met.

5. Type in and evaluate the function `while_test()`.

```
def while_test():
    i=0
    while i<5:
        print i^2
        i=i+1
```

6. Now modify your function to produce a similar function that prints the squares of the integers from 5 to 9.
7. A common way to use a while loop is in a test where you don't know precisely when the test condition will be met. Here we will write a function that finds which letter of a word is the first occurrence of the letter "a". The program prints "no a's when there is no "a" in the word.

```
def find_first_a(word):
    length=len(word)
    i=0
    while i<length:
        if word[i]=="a":
            return i
        else:
            i=i+1
    print "{} contains no a's".format(word)
```

8. What will the following code do?

```
def mystery3(n):
    M=[]
    i=0
    even = lambda x: x%2==0
    while i<n:
        if even(i)==True:
            M.append(i)
        i=i+1
    print M
mystery3(9)
```

9. Write a definition for a function that prints the lists `[1..i]` for `i=0` to `i=4`. Use a while loop. Evaluate and test. Then try to write a definition for a function that prints the lists `[1..i]` for `i=0` to `i=n`.