1. Log in to your Sage Cloud account.
   
   (a) Start the Chrome browser.
   (b) Go to [http://cloud.sagemath.com](http://cloud.sagemath.com) and sign in.
   (c) You should see an existing Project for our class. Click on that.
   (d) Click “New”, call it `c06`, then click “Sage Worksheet”.

2. A very useful arithmetic operator in Sage is the **modulo** operator (represented by `%`). Evaluate `5%2`. Now evaluate `6%2`. Try `99%5`.

**Boolean Expressions in Sage**

A *boolean expression* is one that evaluates to True or False.

3. Evaluate `3==4`.
4. Evaluate `3==3`.
5. Evaluate `3>3`.
6. Evaluate `3>=-3`.
7. Evaluate `13%2==1`.
8. Evaluate `13%2==0`.

While “==” is used as a claim of equality of expressions (the left-hand-side and the right-hand-sides of the “==”) the symbol “!=” is used to express in-equality.

10. Evaluate `5!=5`.

11. We will *assign* a value to a variable “a”. Then we will use that variable in a boolean expression. (These two lines can be typed in one cell, or each in its own cell). Type and evaluate:

    ```python
    a=5
    a>2
    ```
Boolean expressions can be combined with boolean operators like “and” and “or”.

12. Evaluate $3==3$ and $3==4$.

13. Evaluate $3==3$ or $3==4$.

Lists in Sage

A list is a basic data structure in Python and Sage. They are represented by square brackets with comma separated numbers, strings, etc., between them (like [2, 5, 9] or ["red", "blue"]). We have already seen lists in our use of both the solve() and line() commands which used, respectively, a list of equations and a list of points.


16. Lists can be combined with “+”. Evaluate $[2,5,9]+[3,4,5]$.


18. If you want all the integers from $x$ to $y$ you can use the shorthand notation $[x..y]$. Evaluate $[3..7]$.

19. If you want a list with $m$ $n$’s you can use the shorthand notation $[n] * m$. Evaluate $[0]*7$.

20. You can have a list of lists. Evaluate $L=[[0,1],[2,3],[4,5]]$. Now evaluate $L[1]$. Then evaluate $L[1][0]$. What do you think the value of $L[0][1]$ is?

21. You can use map() to apply a function to each term of a list. Let $f(x)=x**2$. Evaluate $\text{map}(f,[2,5,9])$.

22. What could you write to produce a list of all the cubes of the integers from 2 to 17?

23. You can also use list comprehension to get the same behavior as map(). Evaluate $[x**2 \text{ for } x \text{ in } [2,5,9]]$.

24. Use list comprehension to produce a list of the cubes of all the integers from 2 to 17.

25. List comprehension can also be used to filter the numbers in a list. Evaluate $[x \text{ for } x \text{ in } [2,5,9] \text{ if } x%2==0]$. What did this do?

26. Evaluate $[x \text{ for } x \text{ in } [2,5,9] \text{ if } x%2==1]$. What did this do?