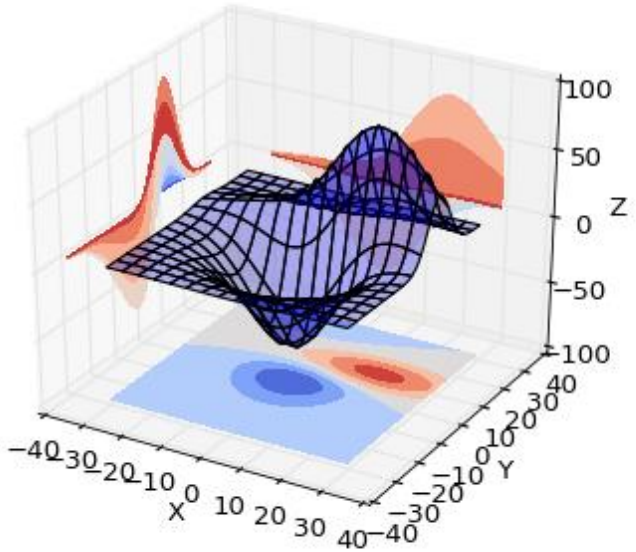
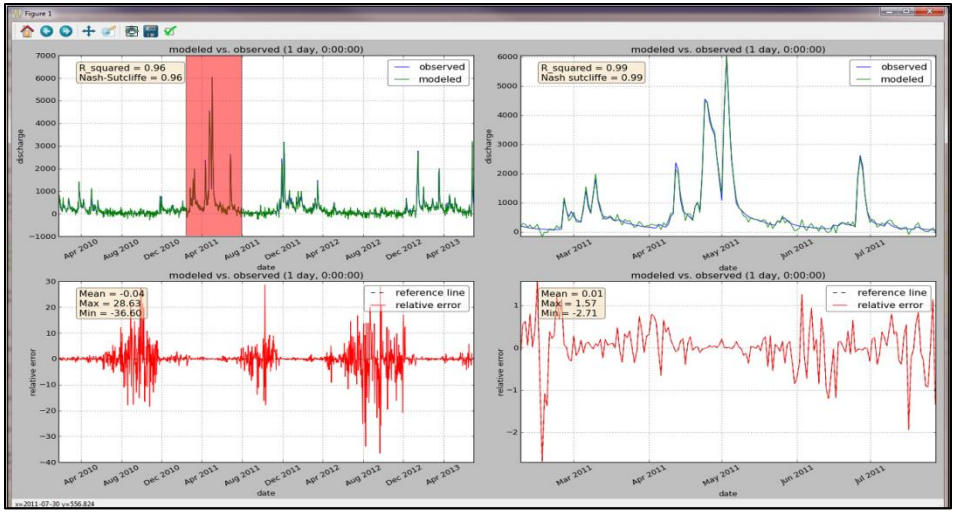
Introduction to Scientific Computing
Meeting 15
Programming with Python



python™

```
# Write Fibonacci series up to n
>>> def fib(n):
>>>     a, b = 0, 1
>>>     while a < n:
>>>         print(a, end=' ')
>>>         a, b = b, a+b
>>>     print()
>>> fib(1000)
0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610
```



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Last Meeting

- Learned multiple ways to print; **print**

```
>>> print “hello”     # Python 2.* print is a statement
>>> print(“hello”)   # Python 3.* print is a function
```

- Ways to print out a single variable or value with string

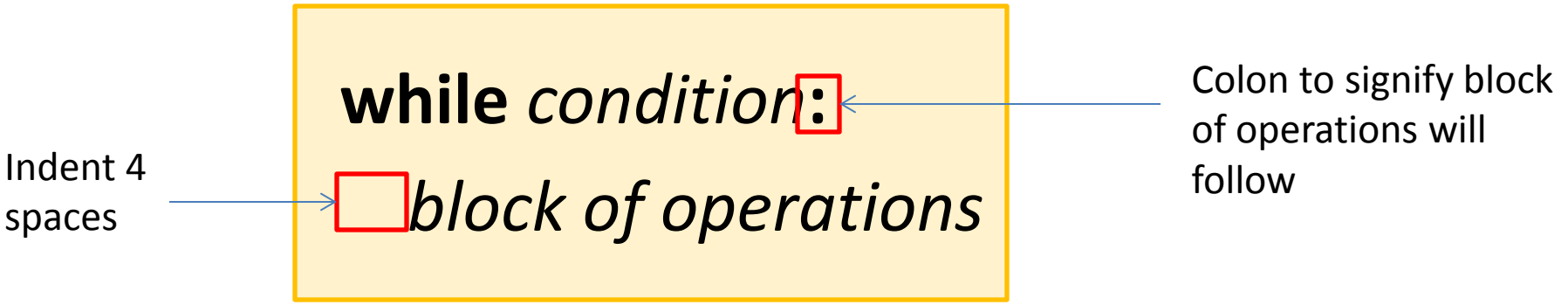
```
>>> x = 10
>>> print(“The value is”), x
>>> print(“The value is %s”) % x
>>> print(“The value is {}”.format(x))
```

- Ways to print out multiple variables with string

```
>>> x = 10
>>> y = 20
>>> print(“The value of x is   and y is   ”), x, y
>>> print(“The value of x is %s and y is %s”) % (x, y)
>>> print(“The value of x is {} and y is {}”.format(x, y))
>>> print(“The value of y is {1} and x is {0}”.format(x, y))
```

Last Meeting – While Loop

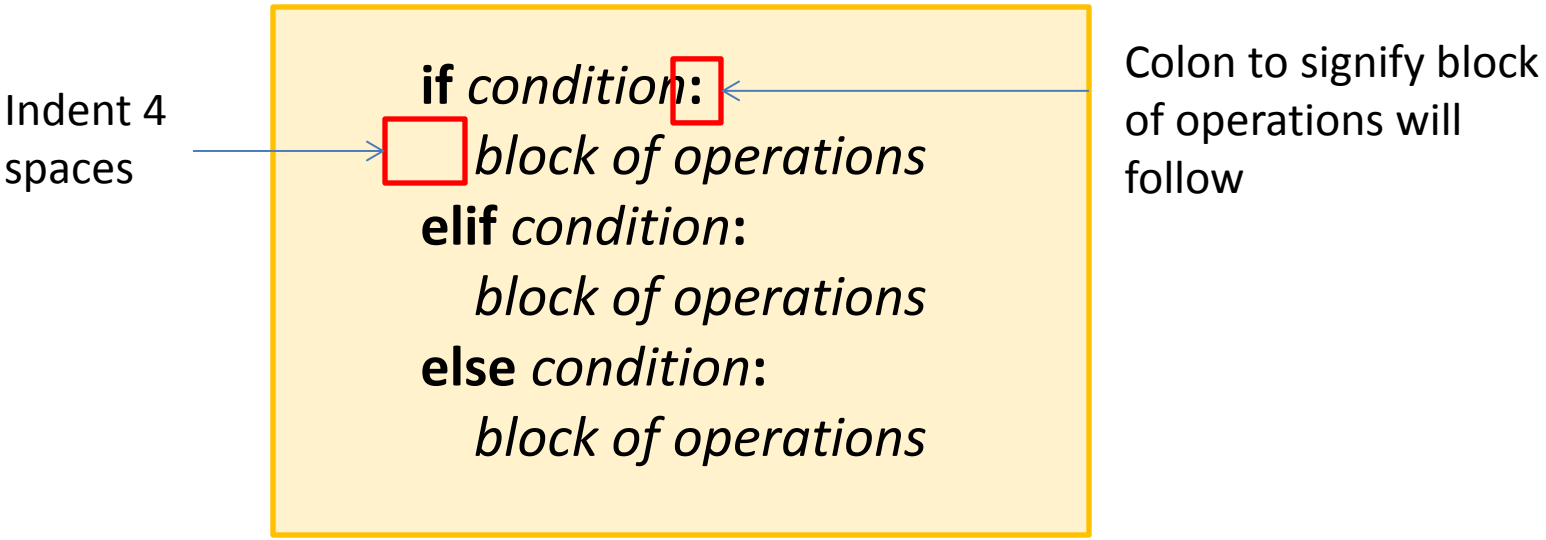
- While loops are used to repeat an operation or set of operations until a certain condition is met.




```
>>> number = 0
>>> while number <= 5:
...     print(number)
...     number += 1
```

Last Meeting – if, elif, else

- if, elif, else are used to make decisions (choices)




```
>>> number = 10
>>> if number == 0:
. . .     print("equals zero")
. . . elif number < 0:
. . .     print("negative")
. . . else number > 0:
. . .     print("positive")
positive
```

Practice Objectives - Print

- Write a print statement to print the following using variables *name* and *city*

  My name is <*fill with your name*> and I live in <*fill with city*>.

  print(“My name is {} and I live in {}”.format(name, city)

- Write a print statement to print the following using a variable *x = 2.*

  2 + 2 is 4

  print(“{} + {} is {}”.format(x, x, x + x)

Practice Objectives – While loop

- Write a while loop to print out numbers starting from 0 to 10.

```
number = 0
while number <= 10:
    print(number)
    number += 1
```

- Write a while loop to print out numbers starting from 10 to -10

```
number = 0
while number >= -10:
    print(number)
    number -= 1
```

Practice Objectives – While loop

- Write a while loop to print out even numbers 2 to 10.

```
number = 2
while number <= 10:
    print(number)
    number += 2
```

OR

```
number = 2
while number <= 10:
    if num % 2 == 0:
        print(number)
    number += 1
```

Practice Objectives – if, elif, else

- Write the following if, elif, else condition to make a decision about today's temperature

temperature = <*look up current temperature in your area*>

```
if temperature <= 32:
   print("It is freezing")
elif 33 <= temperature <= 59:
   print("It is chilly")
elif 60 <= temperature <= 80:
   print("It is comfortable")
elif 81 <= temperature <= 100:
   print("It is hot")
else:
   print("It is boiling")
```

Review – page 1

1. Which of the following prints the following:

   The temperature in Louisville is 90 degrees

a) city = “Louisville”

   temp = 90

   print(“The temperature in %s is %s degrees”) % (city, temp)

b) city = “Louisville”

   temp = 90

   print(“The temperature in {} is {} degrees”).format(city, temp)

c) city = “Louisville”

   temp = 90

   print(“The temperature in %s is %.0f degrees”) % (city, temp)

d) All of the above

Review – page 2

1. How many times does the following program print the variable count?

```
count = 0
while count <= 5:
    print(count)
    count +=1
```

2. What is the output of the following program?

```
number = 0
while number <= 20:
    if number % 2 != 0
        print(number)
    number +=1
```

Review – page 3

1. What is the output of the following program?

```
x = 2.5
y = 3.0
if y <= x:
    print("less than")
elif y >= x:
    print("greater than")
elif y == x:
    print("equal to")
else:
    print("unable to compare")
```

2. What is the output of the following program?

```
hungry = True
if hungry:
    print("Yes, lunch time!")
else:
    print("Not lunch time yet.")
```

Today's Objectives

- Learn about main built-in container called a **list**
- Learn how to loop through lists

Demo – List

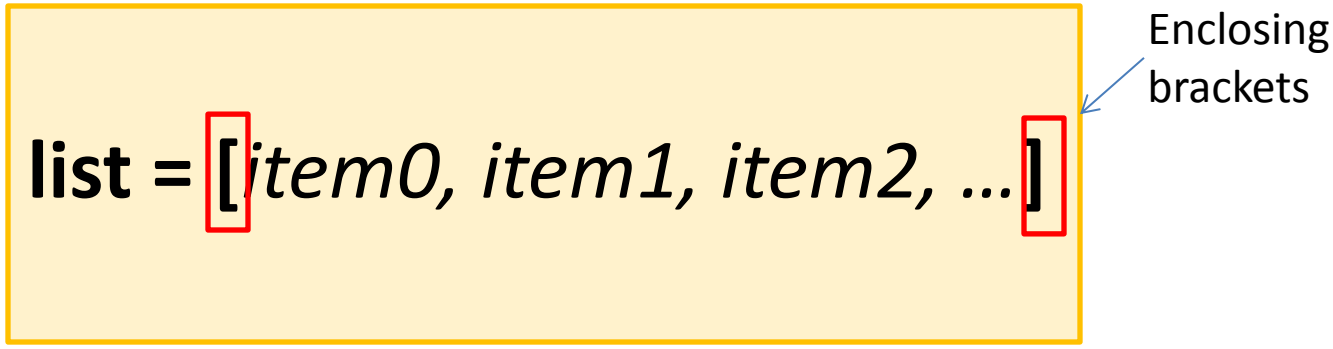
- List is a container or a collection of items.

list = [*item0, item1, item2, …***]**

```
>>> numbers = [0, 1, 2, 3, 4, 5]
>>> names = [“Jeremiah”, “Justin”, “Dave”, “Loren”]
```

Demo – List

- List is a container or a collection of items.



>>> numbers = [0, 1, 2, 3, 4, 5]

>>> names = [“Jeremiah”, “Justin”, “Dave”, “Loren”]

Demo – For Loop

- For loops are used to repeat an operation or set of operations a certain number of times.

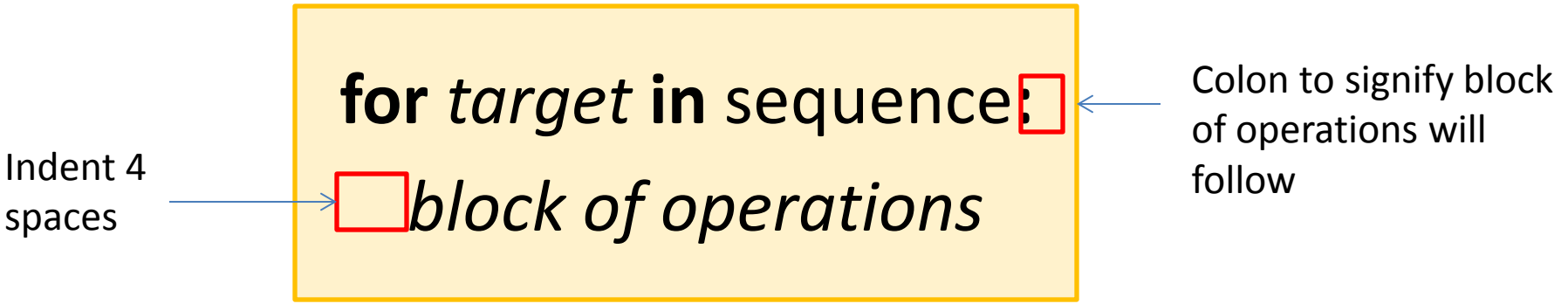
for *target* **in** sequence**:**

block of operations

```
>>> numbers = [0, 1, 2, 3, 4, 5]
>>> for num in numbers:
...     print(num)
```

Last Meeting – For Loop

- For loops are used to repeat an operation or set of operations a certain number of times.




```
>>> numbers = [0, 1, 2, 3, 4, 5]
>>> for num in numbers:
...     print(num)
```

Demo – For Loop vs While Loop

- For loop

```
>>> numbers = [0, 1, 2, 3, 4, 5]
>>> for num in numbers:
. . .     print(num)
```

- While loop

```
>>> number = 0
>>> while number <= 5:
. . .     print(number)
. . .     number += 1
```

Video – Python Basics

- Software Carpentry, Greg Wilson
  - Python: Lists and for loop

    http://software-carpentry.org/v4/python/lists.html

Practice Objectives: lists and for loop

- Create a list called *cities* that contains 5 strings of different city names.
- Create a for loop to print out each city name in the list called *cities*.

Next meeting

- Python – Learn about built-in containers (collections)
  - **more on lists and for loop**
  - **dictionaries**