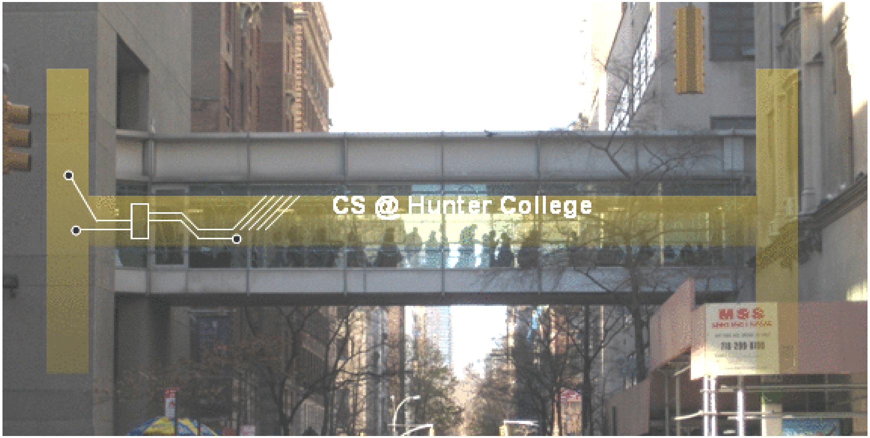
# CSci 127: Introduction to Computer Science



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    - Do the sample final problems (in lecture & full sample exam come December).

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  - Do the associated reading.
- Today's lecturers include:
  - Genady Maryash (adjunct coordinator) &
  - Katherine Howitt (tutor coordinator).

## Today's Topics

- Folium Recap
- Indefinite Loops
- Searching Data
- Random Numbers

## folium

- A module for making HTML maps.

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- Outputs `.html` files which you can open in a browser.
- An extra step:

*Write code.* $\rightarrow$ *Run program.* $\rightarrow$ *Open .html in browser.*

## From Last Time: folium example

*What does this code do?*

```
import folium
import pandas as pd

cuny = pd.read_csv('cunyLocations.csv')
mapCUNY = folium.Map(location=[40.75, -74.125])

for index,row in cuny.iterrows():
    lat = row["Latitude"]
    lon = row["Longitude"]
    name = row["Campus"]
    if row["College or Institution Type"] == "Senior Colleges":
        collegeIcon = folium.Icon(color="purple")
    else:
        collegeIcon = folium.Icon(color="blue")
    newMarker = folium.Marker([lat, lon], popup=name, icon=collegeIcon)
    newMarker.add_to(mapCUNY)

mapCUNY.save(outfile='cunyLocationsSenior.html')
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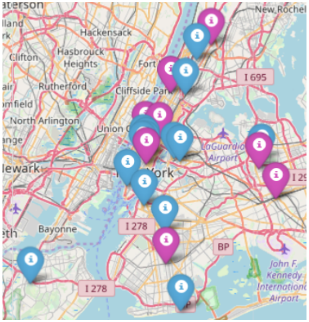
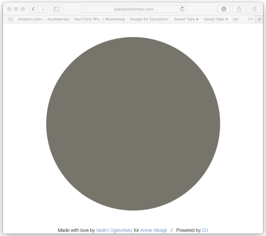


# From Last Time: koalas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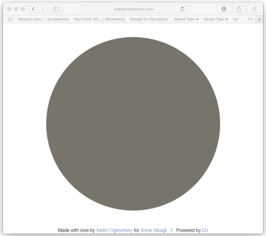
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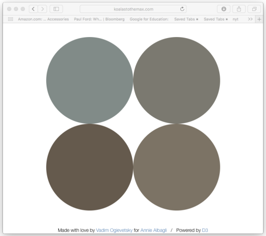
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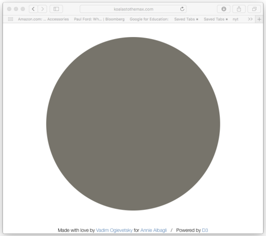
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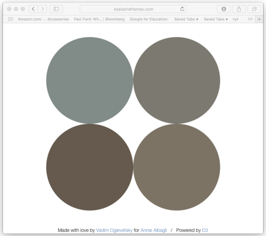
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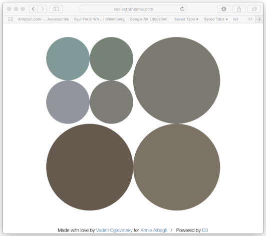
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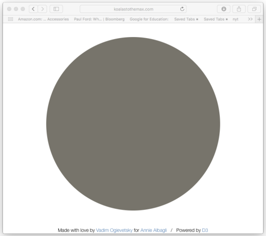
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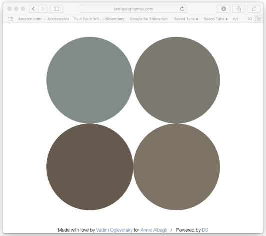
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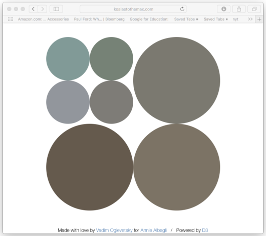
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`http://koalastothemax.com`

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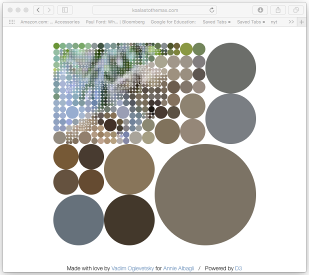
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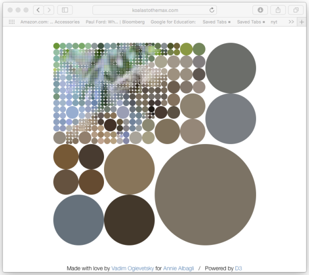
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- Top-down design puzzle:
  - What does `koalastomax` do?
  - What does each circle represent?
- Write a high-level design for it.
- Translate into a `main()` with function calls.

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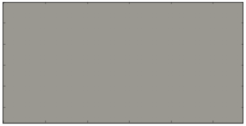

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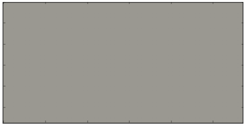

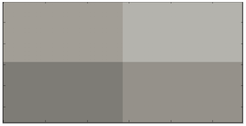

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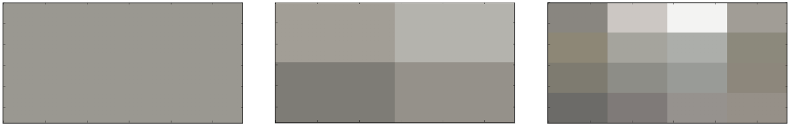

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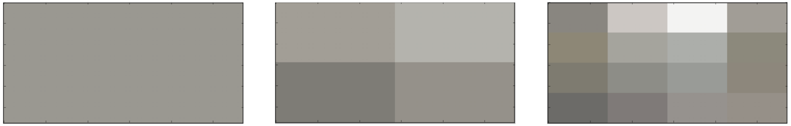

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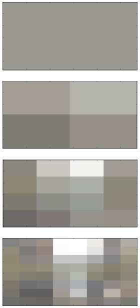

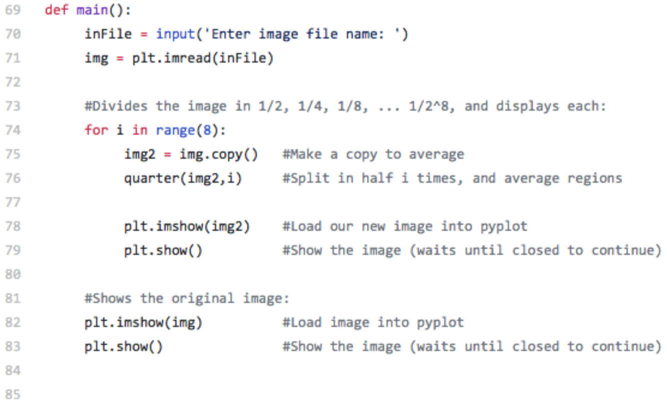

```
def main():
    inFile = input('Enter image file name: ')
    img = plt.imread(inFile)

    #Divides the image in 1/2, 1/4, 1/8, ... 1/2^8, and displays each:
    for i in range(8):
        img2 = img.copy()    #Make a copy to average
        quarter(img2,i)      #Split in half i times, and average regions

        plt.imshow(img2)     #Load our new image into pyplot
        plt.show()           #Show the image (waits until closed to continue)

    #Shows the original image:
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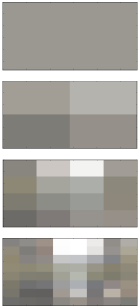

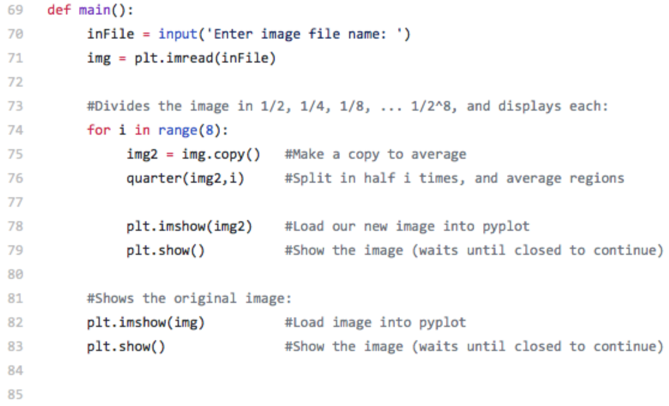

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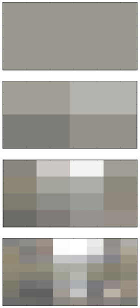

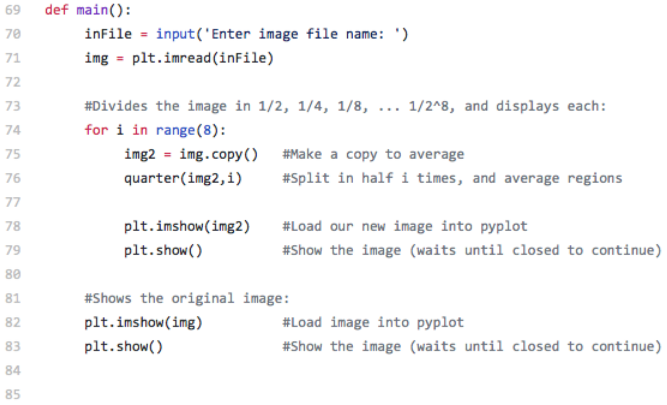

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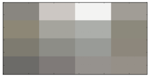
- The `main()` is written for you.
- Only fill in two functions: `average()` and `setRegion()`.

## From Last Time: koalas

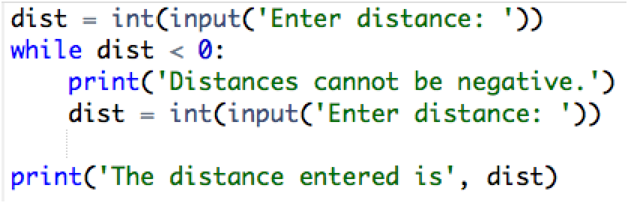
*Process:*



Get template $\rightarrow$ Fill in missing $\rightarrow$ Test locally $\rightarrow$ Submit to
from `github` $\rightarrow$ functions $\rightarrow$ idle3/python3 $\rightarrow$ Gradescope

## In Pairs or Triples:

*Predict what the code will do:*

- 

```python
dist = int(input('Enter distance: '))
while dist < 0:
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    dist = int(input('Enter distance: '))

print('The distance entered is', dist)
```
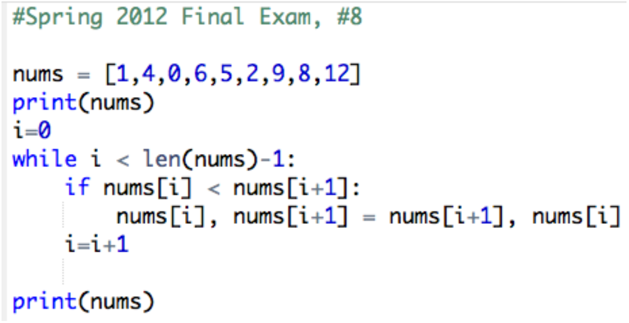

- 

```python
#Spring 2012 Final Exam, #8

nums = [1,4,0,6,5,2,9,8,12]
print(nums)
i=0
while i < len(nums)-1:
    if nums[i] < nums[i+1]:
        nums[i], nums[i+1] = nums[i+1], nums[i]
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print(nums)
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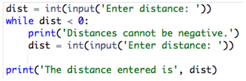
## Python Tutor



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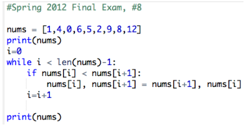

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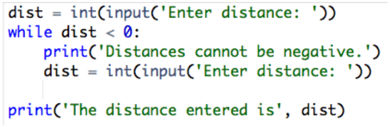
(Demo with `pythonTutor`)

## Indefinite Loops



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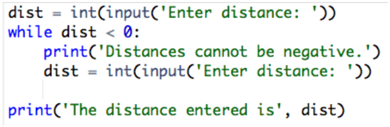

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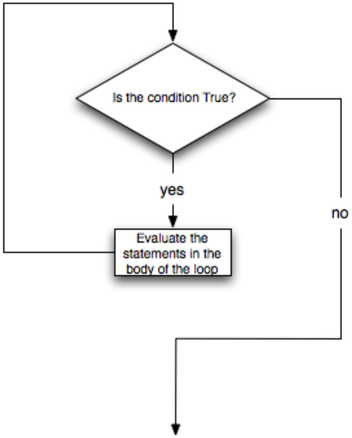

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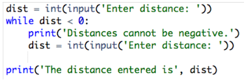

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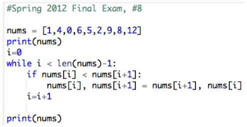

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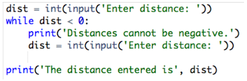
- Indefinite loops repeat as long as the condition is true.

## Indefinite Loops



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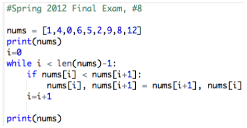

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- Indefinite loops repeat as long as the condition is true.
- Could execute the body of the loop zero times, 10 times, infinite number of times.

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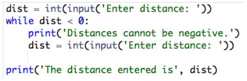

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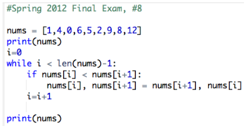

```
#Spring 2012 Final Exam, #8

nums = [1,4,0,6,5,2,9,8,12]
print(nums)
i=0
while i < len(nums)-1:
    if nums[i] < nums[i+1]:
        nums[i], nums[i+1] = nums[i+1], nums[i]
    i=i+1

print(nums)
```

- Indefinite loops repeat as long as the condition is true.
- Could execute the body of the loop zero times, 10 times, infinite number of times.
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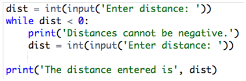
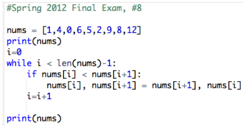
## Indefinite Loops



```
dist = int(input('Enter distance: '))
while dist < 0:
    print('Distances cannot be negative.')
    dist = int(input('Enter distance: '))

print('The distance entered is', dist)
```



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- Indefinite loops repeat as long as the condition is true.
- Could execute the body of the loop zero times, 10 times, infinite number of times.
- The condition determines how many times.
- Very useful for checking input, simulations, and games.

## In Pairs or Triples:

*Answer the following questions on your lecture slip (paper or* `tinyurl.com/yamkjh96`*):*

Of the students in the room,

- Whose name comes first alphabetically?
- Whose name comes last alphabetically?
- Is there someone in the room with your initials?

## In Pairs or Triples:

*While we tabulate results:*

Design a program that takes a CSV file and a set of initials:

- Whose name comes first alphabetically?
- Whose name comes last alphabetically?
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## Results: Lecture Slip Question

(Show tabulated results...)

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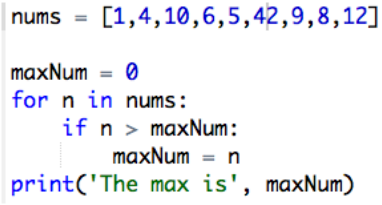
  - while there are items in the list and not `found`
    - If item matches your value, set `found = True`

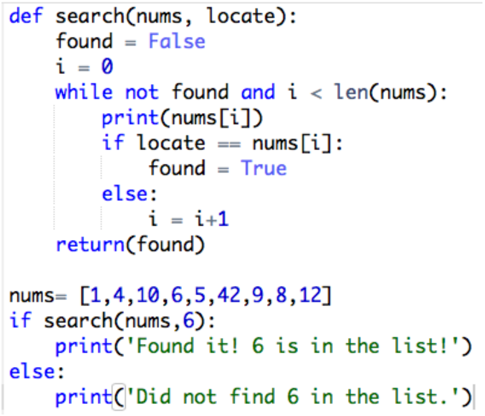
## In Pairs or Triples:

- *Predict what the code will do:*



```
nums = [1,4,10,6,5,42,9,8,12]

maxNum = 0
for n in nums:
    if n > maxNum:
        maxNum = n
print('The max is', maxNum)
```

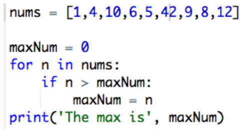


```
def search(nums, locate):
    found = False
    i = 0
    while not found and i < len(nums):
        print(nums[i])
        if locate == nums[i]:
            found = True
        else:
            i = i+1
    return(found)

nums= [1,4,10,6,5,42,9,8,12]
if search(nums,6):
    print('Found it! 6 is in the list!')
else:
    print('Did not find 6 in the list.')
```

- Write a function that asks a user for number after 2000 but before 2018. The function should repeatedly ask the user for a number until they enter one within the range and return the number.

## Python Tutor



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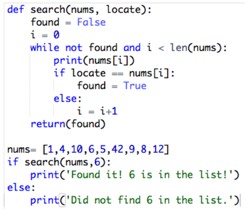

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(Demo with `pythonTutor`)

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## Coding

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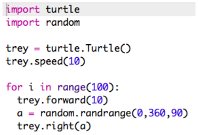
```
def getYear():
    num = 0
    while num <= 2000 or num >= 2018:
        num = int(input('Enter a number > 2000 & < 2018'))
    return(num)
```

## Python's random package

- Python has a built-in package for generating pseudo-random numbers.



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import turtle
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trey = turtle.Turtle()
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for i in range(100):
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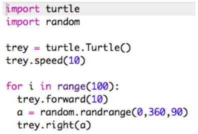

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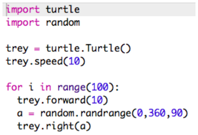

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  which gives a number chosen randomly from the specified range.

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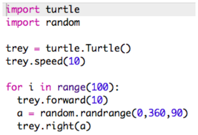

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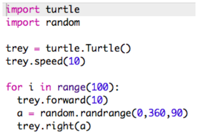

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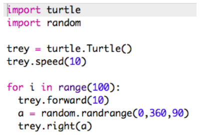

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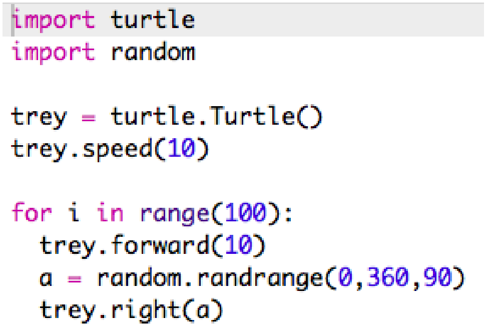
## Trinket



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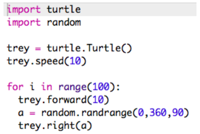
(Demo turtle random walk)

## Recap: Indefinite Loops & Random Numbers



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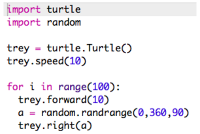

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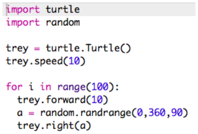

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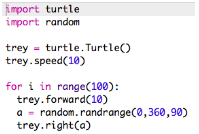
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