Taller 4

Métodos Computacionales para Políticas Públicas - URosario

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Instrucciones:

- Guarde una copia de este *Jupyter Notebook* en su computador, idealmente en una carpeta destinada al material del curso.
- Modifique el nombre del archivo del *notebook*, agregando al final un guión inferior y su nombre y apellido, separados estos últimos por otro guión inferior. Por ejemplo, mi *notebook* se llamaría: mcpp_taller4_santiago_matallana
- Marque el *notebook* con su nombre y e-mail en el bloque verde arriba. Reemplace el texto "[Su nombre acá]" con su nombre y apellido. Similar para su e-mail.
- Desarrolle la totalidad del taller sobre este *notebook*, insertando las celdas que sea necesario debajo de cada pregunta. Haga buen uso de las celdas para código y de las celdas tipo *markdown* según el caso.
- Recuerde salvar periódicamente sus avances.
- Cuando termine el taller:
  1. Descárguelo en PDF.
  2. Suba los dos archivos (.pdf y .ipynb) a su repositorio en GitHub antes de la fecha y hora límites.

(Todos los ejercicios tienen el mismo valor.)

Zelle, Exercises 6.8 (p. 159):

- True/False: 1-10
- Multiple choice: 2, 3, 6, 7, 10
- Programming Exercises: 1, 3, 4, 11, 12, 13

True/False

1. Programmers rarely define their own functions.

FALSE

2. A function may only be called at one place in a program.

FALSE

3. Information can be passed into a function through parameters.

TRUE

4. Every Python function returns some value.

FALSE

5. In Python, some parameters are passed by reference.

FALSE

6. In Python, a function can return only one value.

FALSE

7. Python functions can never modify a parameter.

FALSE

8. One reason to use functions is to reduce code duplication.

TRUE

9. Variables defined in a function are local to that function.

TRUE

10. It’s a bad idea to define new functions if it makes a program longer.

FALSE

Multiple Choice

1. The part of a program that uses a function is called the

b) caller

2. A Python function definition begins with

a) def

3. A function can send output back to the program with a(n)

a) return

4. Formal and actual parameters are matched up by

b) position

5. Which of the following is not a step in the function calling process?

d) control returns to the point just before the function was called.

6. In Python, actual parameters are passed to functions

a) by value

7. Which of the following is not a reason to use functions?

d) to demonstrate intellectual superiority

8. If a function returns a value, it should generally be called from

a) an expression

9. A function with no return statement returns

a) nothing

10. A function can modify the value of an actual parameter only if it's

a) mutable

Programming Exercises

1. Write a program to print the lyrics of the song "Old MacDonald." Your program should print the lyrics for five different animals, similar to the example verse below.

In [11]:

```
def Old_MacDonald_song():
    animals =[('cow', 'moo'),('pig','oink'),('chicken','cluck'),('dog','whof'),('cat','miau')]

    for i in range(0,len(animals)):
        print("Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!")
        print(f"And on that farm he had a {animals[i][0]},Ee-igh, Ee-igh, Oh!")
        print(f"Oh! With a {animals[i][1]}, {animals[i][1]} here and a {animals[i][1]}, {animals[i]
1]} there.")
        print(f"Here a {animals[i][1]}, there a {animals[i][1]}, everywhere a {animals[i][1]}, {ani
als[i][1]}.")
        print("Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!")
        print("\n")
```

In [12]:

```
Old_MacDonald_song()
```

```
Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!
And on that farm he had a cow,Ee-igh, Ee-igh, Oh!
Oh! With a moo, moo here and a moo, moo there.
Here a moo, there a moo, everywhere a moo, moo.
Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!


Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!
And on that farm he had a pig,Ee-igh, Ee-igh, Oh!
Oh! With a oink, oink here and a oink, oink there.
Here a oink, there a oink, everywhere a oink, oink.
Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!


Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!
And on that farm he had a chicken,Ee-igh, Ee-igh, Oh!
Oh! With a cluck, cluck here and a cluck, cluck there.
Here a cluck, there a cluck, everywhere a cluck, cluck.
Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!


Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!
And on that farm he had a dog,Ee-igh, Ee-igh, Oh!
Oh! With a whof, whof here and a whof, whof there.
Here a whof, there a whof, everywhere a whof, whof.
Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!
```

```
Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!
And on that farm he had a cat,Ee-igh, Ee-igh, Oh!
Oh! With a miau, miau here and a miau, miau there.
Here a miau, there a miau, everywhere a miau, miau.
Old MacDonald had a farm, Ee-igh, Ee-igh, Oh!
```

3. Write definitions for these functions:

sphereArea(radius) Returns the surface area of a sphere having the given radius.

sphereVolume(radius) Returns the volume of a sphere having the given radius.

In [7]:

```
def sphereArea(radius):
    p=3.1415926
    s= 4*p * radius * radius
    print(f"The area of the sphere is {s}")
```

In [8]:

```
sphereArea(10)
```

```
The area of the sphere is 1256.63704
```

In [9]:

```
def sphereVolume(radius):
    p=3.1415926
    v= 4/3*p*radius*radius*radius
    print(f"The volume of the sphere is {v}")
```

In [10]:

```
sphereVolume(40)
```

```
The volume of the sphere is 268082.5685333333
```

Use your functions to solve Programming Exercise 1 from Chapter 3.

In [6]:

```
def function():
    x= int(input("introduzca el radio de una esfera:"))
    sphereArea(x)
    sphereVolume(x)

function()
```

```
introduzca el radio de una esfera:3
The area of the sphere is 113.09733360000001
The volume of the sphere is 113.09733359999998
```

4. Write definitions for the following two functions:

sumN(n) returns the sum of the first n natural numbers.

sumNCubes(n) returns the sum of the cubes of the first n natural numbers.

In [13]:

```
def sumN(n):
    a=0
    for i in range(0,n+1):
        a=a+i
    return a
```

In [14]:

```
sumN(10)
```

Out[14]:

55

In [15]:

```
def sumNCubes(n):
    a=0
    for i in range(0,n+1):
        a=a+(i*i)
    return a
```

In [16]:

```
sumNCubes(3)
```

Out[16]:

14

In [17]:

```
def sumN(n):
    a=0
    for i in range(0,n+1):
        a=a+i
    return a
def sumNCubes(n):
    a=0
    for i in range(0,n+1):
        a=a+(i*i)
    return a

x= int(input("introduzca un numero"))
print(f"the sum of the first {x} natural numbers is: {sumN(x)}")
print(f"the sum of the cubes of the first {x} natural numbers is: {sumNCubes(x)}")
```

```
introduzca un numero4
the sum of the first 4 natural numbers is: 10
the sum of the cubes of the first 4 natural numbers is: 30
```

11. Write and test a function to meet this specification.

squareEach(nums) nums is a list of numbers. Modifies the list by squaring each entry.

In [18]:

```
def squareEach(nums):
    for i in range(0,len(nums)):
        a= nums[i]*nums[i]
        nums[i]=a
    print(nums)
```

In [19]:

```
squareEach([2,4,6,8,10])
```

```
[4, 16, 36, 64, 100]
```

12. Write and test a function to meet this specification.

sumList(nums) nums is a list of numbers. Returns the sum of the numbers in the list.

In [20]:

```
def sumList(nums):
    a=0
    for i in range(0,len(nums)):
        a= a + nums[i]
    print(a)
```

In [21]:

```
sumList([2,3,4,5,6])
```

```
20
```

13. Write and test a function to meet this specification.

toNumbers(strList) strList is a list of strings, each of which represents a number. Modi- fies each entry in the list by converting it to a number.

In [22]:

```
def toNumbers(strList):
    num = [] *len(strList)
    for i in range(len(strList)):
        num.append(eval(strList[i]))
    print(num)
```

In [23]:

```
toNumbers(['345','289','2','4','97'])
```

```
[345, 289, 2, 4, 97]
```