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 aquí]" 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:false

2:false

3:true

4:true

5:false

6:false

7:false

8:true

9:true

10:false

Multiple Choice:

2 A python function definitions begins with:

```
a) def
```

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

```
a)return
```

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
```

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", print the lyrics for five different animals.

In [27]:
```
def oldmacsong():
    Base="Old MacDonald had a farm, Ee-igh, Eigh, Oh!"
    Cow="""And on his farm he had a Cow Ee-igh, Eigh, Oh!.
With a moo, moo here and a moo moo there.
Here a moo, there a moo, everywhere a moo moo"""
    Dog="""And on his farm he had a Dog Ee-igh, Eigh, Oh!.
With a wof, wof here and wof wof there.
Here a wof, there a wof, everywhere a wof wof"""
    Cat="""And on his farm he had a Cat Ee-igh, Eigh, Oh!.
With a mau, mau here and mau mau there.
Here a mau, there a mau, everywhere a mau mau"""
    Octopus="""And on his farm he had an Octopus Ee-igh, Eigh, Oh!.
With a slurp, slurp here and slurp slurp there.
Here a slurp, there a slurp everywhere a slurp slurp."""
    Perico="""And on his farm he had a Perico Ee-igh, Eigh, Oh!.
With a raw, raw here and raw raw there.
Here a raw, there a raw everywhere a raw raw"""
    print(Base+"\n"+Cow+"\n"+Base+"\n"+Dog+"\n"+Base+"\n"+Cat+"\n"+Base+"\n"+Octopus+"\n"+Base+"\n"+Perico+"\n"+Base)
```

In [28]:
```
oldmacsong()
```

```
Old MacDonald had a farm, Ee-igh, Eigh, Oh!
And on his farm he had a cow Ee-igh, Eigh, 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, Eigh, Oh!
And on his farm he had a Dog Ee-igh, Eigh, Oh!.
With a wof, wof here and wof wof there.
Here a wof, there a wof, everywhere a wof wof
Old MacDonald had a farm, Ee-igh, Eigh, Oh!
And on his farm he had a Cat Ee-igh, Eigh, Oh!.
With a mau, mau here and mau mau there.
Here a mau, there a mau, everywhere a mau mau
Old MacDonald had a farm, Ee-igh, Eigh, Oh!
And on his farm he had an Octopus Ee-igh, Eigh, Oh!.
With a slurp, slurp here and slurp slurp there.
Here a slurp, there a slurp everywhere a slurp slurp.
Old MacDonald had a farm, Ee-igh, Eigh, Oh!
And on his farm he had a Perico Ee-igh, Eigh, Oh!.
With a raw, raw here and raw raw there.
Here a raw, there a raw everywhere a raw raw
Old MacDonald had a farm, Ee-igh, Eigh, 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 given the radius. ### Use your functions to solve Programming Exercise 1 from Chapter 3.

In [43]:
```
import math
pi=math.pi
def sphereArea(n):
    area=4*pi*(n**2)
    return(area)
```

In [44]:
```
sphereArea(7)
```

Out[44]:
```
615.7521601035994
```

In [45]:
```
def sphereVolume(n):
    volumen=(4/3)*pi*(n**3)
    return(volume)
```

In [46]:
```
sphereVolume(7)
```

Out[46]:
```
1436.7550402417319
```

Programming Exercise 1 chapther 3:

- write a program to calculate the volume and surface area of a sphere from its radius, given as input

In [53]:
```
x=int(input("Ingrese el radio de la esfera: "))
print("El Area es: "+str(sphereArea(x))+" unidades cuadradas"+" y el Volumen es: "+str(sphereVolume(x))+" unidades cúbicas")
```

```
Ingrese el radio de la esfera: 7
El Area es: 615.7521601035994 unidades cuadradas y el Volumen es: 1436.7550402417319 unidades cúbicas
```

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 [64]:
```
def sumN(n):
    suma=0
    if n<=0:
        print("sumN solo funciona con numeros naturales")
    else:
        while n>0:
            suma=suma+n
            n=n-1
    return suma
```

In [65]:
```
sumN(6)
```

Out[65]:
```
21
```

In [66]:
```
def sumNCubes(n):
    add=0
    if n<=0:
        print("sumNCubes solo funciona con numeros naturales")
    else:
        while n>0:
            add=add+(n**2)
            n=n-1
    return add
```

In [67]:
```
sumNCubes(6)
```

Out[67]:
```
91
```

In [72]:
```
x=int(input("Digite un número natural: "))
while x<=0:
    x=int(input("Por favor que sea un número natural: "))
if x==1:
    print("la suma del primer número natural es :"+str(sumN(x))+" y la suma de su cuadrado es: "+str(sumNCubes(x)))
else:
    print("la suma de los primeros "+str(x)+" números naturales es: "+str(sumN(x))+", y la suma de sus cuadrados es: "+str(sumNCubes(x)))
```

```
Digite un número natural: 6
la suma de los primeros 6 números naturales es: 21, y la suma de sus cuadrados es: 91
```

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 [36]:
```
nums=[1,2,3,4,5,6,7,8,9,10]
```

In [37]:
```
def squareEach(lista):
    for x in range (len(lista)):
        lista[x]=lista[x]**2
    return lista
```

In [38]:
```
squareEach(nums)
```

Out[38]:
```
[1, 4, 9, 16, 25, 36, 49, 64, 81, 100]
```

In [39]:
```
nums
```

Out[39]:
```
[1, 4, 9, 16, 25, 36, 49, 64, 81, 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 [40]:
```
numeros=[2,4,6,8,10]
```

In [41]:
```
def sumList(lista):
    sumatoria=0
    for x in lista:
        sumatoria += x
    return sumatoria
```

In [42]:
```
sumList(numeros)
```

Out[42]:
```
30
```

13

Write and test a function to meet this specification

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

In [43]:
```
lista_numeros=["1","2","3","4","5"]
```

In [44]:
```
lista_numeros
```

Out[44]:
```
['1', '2', '3', '4', '5']
```

In [45]:
```
def toNumbers(strList):
    for x in range (len(strList)):
        strList[x]=int(strList[x])
    return strList
```

In [46]:
```
toNumbers(lista_numeros)
```

Out[46]:
```
[1, 2, 3, 4, 5]
```

In [47]:
```
lista_numeros
```

Out[47]:
```
[1, 2, 3, 4, 5]
```