



UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE  
INSTITUTO METRÓPOLE DIGITAL

# IMD0033 – PROBABILIDADE

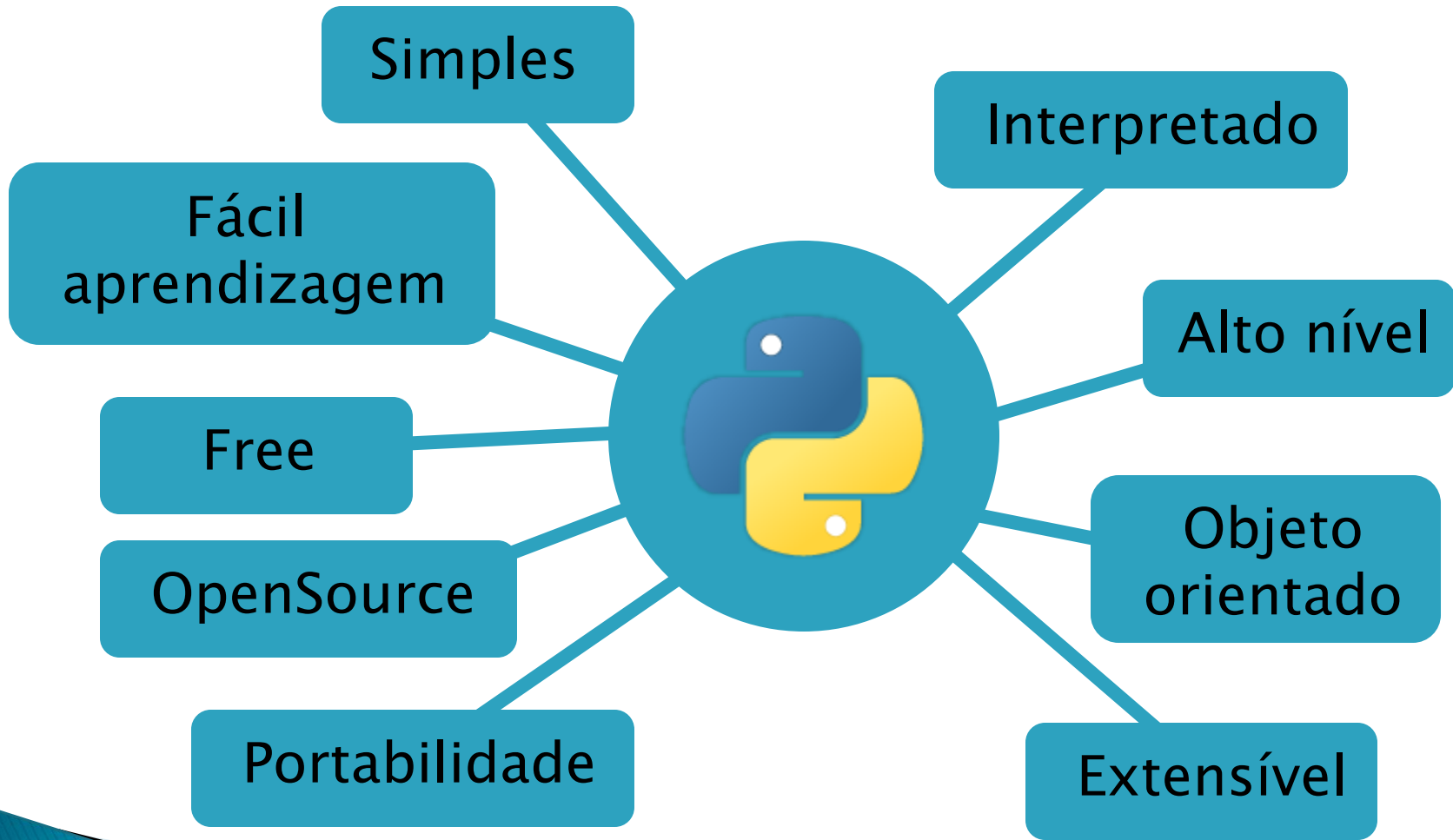
Introdução à Python I

Prof. Dr. Tetsu Sakamoto  
Instituto Metr pole Digital, sala A224  
Universidade Federal do Rio Grande do Norte  
[tetsu@imd.ufrn.br](mailto:tetsu@imd.ufrn.br)

# Objetivos

- ▶ Noções de programação em Python;
- ▶ Resolução de exercícios e desafios;

# Introdução à Python



# Instalação



[www.python.org/downloads](http://www.python.org/downloads)



<https://anaconda.org/>

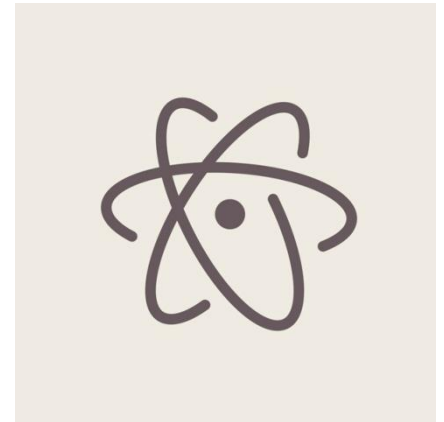
# Editores de texto



[github.com/spyder](https://github.com/spyder/spyder)  
-ide/spyder



[www.jetbrains.com/](https://www.jetbrains.com/pycharm/)  
pycharm/



[ide.atom.io/](https://ide.atom.io/)

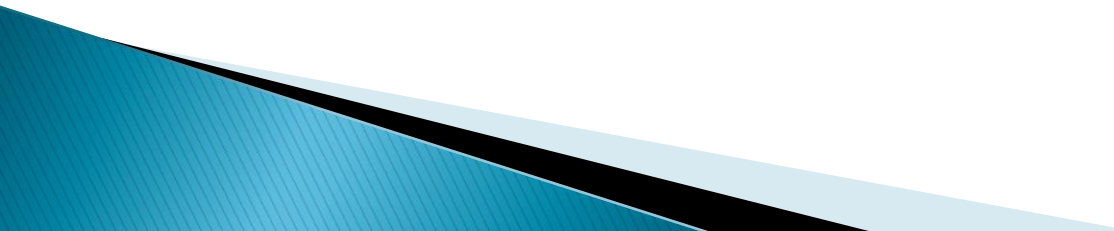
Outras sugestões de IDEs e editores de texto:

[wiki.python.org/moin/IntegratedDevelopmentEnvironments](https://wiki.python.org/moin/IntegratedDevelopmentEnvironments)

# Hello World

```
print("Hello World")
```

```
print('Hello World')
```



# Comment

```
# This a comment
```

```
'''
```

```
Multiline comment
```

```
Multiline comment
```

```
Multiline comment
```

```
'''
```



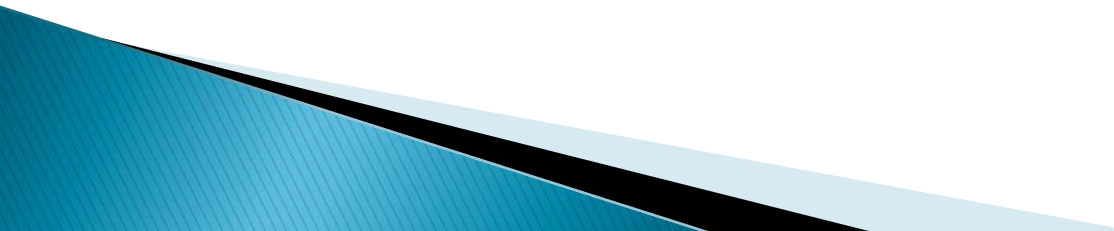
# Variables

```
name = 'Tetsu'           # string
age = 32                  # number
```

```
hobby = ['family',       # list
          'computer',
          'manga' ]
```

```
even = (2,4,6)           # tuple
```

```
data = { 'name': name,   # dictionary
          'age': age
          'hobby': hobby }
```





# String

```
hello = 'hello'           # string in single quotes
world = "world"           # string in double quotes

print(hello)               # prints "hello"
print(len(hello))          # string length "5"
hw = hello + " " + world  # concatenation
print(hw)                  # prints "hello world"
print((hw+" ")*5)          # prints "hello world" 5 times
print(hw[2])               # prints 3rd char of hw "l"
print(hw[2:5])             # prints 3rd to fifth char
                           # "llo"
```

# Mathematical Operators

```
x = 5
print(x + 2)    # addition (7)
print(x - 2)    # subtraction (3)
print(x * 2)    # multiplication (10)
print(x / 2)    # division (2.5)
print(x % 2)    # module (1)
print(x ** 2)   # exponential (25)
print(x // 2)   # floor division (2)

x += 1          # incrementation
print(x)        # prints (6)
```

# List

```
fruits = ['apple', 'banana', 'mango', 'pineapple']

print(fruits[0])           # prints first element
print(fruits[-1])          # prints last element
fruits[0] = 'pear'         # change element
print(fruits[1:3])         # prints 2nd to 3rd elements

vegetables = ['carrot', 'cucumber', 'potato']
# concatenated list
ingredients = fruits + vegetables

# create list of list
ingredients = [fruits, vegetables]
print(ingredients[1][1]) # prints 2nd of 2nd list
```

# List

```
fruits = ['apple', 'banana', 'mango', 'pineapple']

len(fruits)           # number of elements (4)
max(fruits)           # maximum
min(fruits)           # minimum
fruits.append('melon') # append an element

fruits.remove('melon') # remove element

fruits.insert(1, 'melon') # insert element in index 1

del fruits[1]          # delete 2nd element

fruits.sort()          # sort list

fruits.reverse()       # reverse sort list
```

# For loops

```
# for loops
for i in range(0,10):
    print(i, ' ', end='') # prints from 1 to 9

fruits = ['apple', 'banana', 'mango']

for y in fruits:
    print(y)                # prints all elements
```

# Exercício

- ▶ Crie um programa que calcula média e desvio padrão.

- ▶ Média:

$$\bar{x} = \frac{\sum x_i}{n}$$

- ▶ Desvio padrão:

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

# While Loops

```
import random

i = 0

# while loop
while (i < 100):

    randNum = random.randrange(0, 100) # random number(0-100)
    print(randNum)

    if (randNum % 10 == 0):
        break
    else:
        i += 1
        continue
```

# Tuple

```
# Tuple: unchangable a list  
pi_tuple = (3,1,4,8,4)
```

```
print(len(pi_tuple))  
print(max(pi_tuple))  
print(min(pi_tuple))
```

```
# length of tuple "5"  
# maximum element "8"  
# maximum element "1"
```

```
pi_list = list(pi_tuple)  
pi_list.append(5)
```

```
# convert tuple to list
```

```
new_tuple = tuple(pi_list)  
print(new_tuple)
```

```
# convert list to tuple
```



# Dictionary

```
my_data= { 'fname': 'Tetsu',  
           'sname': 'Sakamoto',  
           'age': 32,  
           'work': 'UFMG' }
```

```
print(my_data['fname'])           # prints "Tetsu"  
my_data['work'] = 'UFRN'         # changes value  
del my_data['age']                # delete key 'age'  
print(len(my_data))              # prints map length "3"  
print(my_data.keys())            # prints all keys  
print(my_data.values())          # prints all values
```

# Conditionals

```
age = 17
if ((age >= 18) and (age <= 70)):
    # (18 <= age <= 70) also works
    # execute if condition1 is true
    print('you must vote')

elif (age >= 16):
    # execute if condition1 is false
    # and condition2 is true
    print('you may vote')

else:
    # execute if condition1 and
    # condition 2 is false
    print('you can\'t vote yet')
```

## Logical operators

```
== # equal
!= # not equal
<  # greater than
<= # greater than or equal
>  # minor than
>= # minor than or equal

and # and rule
or  # or rule
```

# Functions

```
# functions
def shouldIVote(input):
    age = input
    if ((age >= 18) and (age <= 70)):
        result = 'yes, you must vote'
    elif (age >= 16):
        result = 'yes, you may vote'
    else:
        result = 'no, you can\'t vote yet'
    return result

print(shouldIVote(25)) # prints "yes, you must vote"
```

# Open file

```
# open file
f = open("teste.csv", "r")

# read file
data = f.read()

# prints the entire data
print(data)

# splits data based on '\n'
rows = data.split('\n')

# prints the first five rows
for row in range(0,5):
    print(rows[row])
```

# Exercício

## ▶ Wisconsin Breast Cancer Data

- Baixe o arquivo:

<https://archive.ics.uci.edu/ml/machine-learning-databases/breast-cancer-wisconsin/wdbc.data>

- Separe os dados conforme o status do câncer (segunda coluna: M – maligno; B – benigno);
- Calcule a média e o desvio padrão das colunas restantes.

# Sugestões de exercícios

- ▶ Boston Python Puzzle  
[puzzles.bostonpython.com/](http://puzzles.bostonpython.com/)
  - ▶ Solve Python | HackerRank  
[www.hackerrank.com/domains/python](http://www.hackerrank.com/domains/python)
  - ▶ Python challenge:  
[www.pythonchallenge.com/index.php](http://www.pythonchallenge.com/index.php)
- 