**PROGRAMMING FOR DATA SCIENCE (WITH PYTHON)**

**Lab 2**

1. Hoàn thành đoạn chương trình sau

```
# Create variables var1 and var2
var1 = [1, 2, 3, 4]
var2 = True
# Print out type of var1


# Print out length of var1


# Convert var2 to an integer: out2
```

2. Hoàn thành đoạn chương trình sau

```
# Create lists first and second
first = [11.25, 18.0, 20.0]
second = [10.75, 9.50]
# Paste together first and second: full


# Sort full in descending order: full_sorted


# Print out full_sorted
```

3. Hoàn thành đoạn chương trình sau

```
# string to experiment with: room
```

```
room = "poolhouse"
# Use upper() on room: room_up


# Print out room and room_up


# Print out the number of o's in room
```

4. Hoàn thành đoạn chương trình sau

```
# Create list areas
areas = [11.25, 18.0, 20.0, 10.75, 9.50]
# Print out the index of the element 20.0


# Print out how often 14.5 appears in areas
```

5. Hoàn thành đoạn chương trình sau

```
# Create list areas
areas = [11.25, 18.0, 20.0, 10.75, 9.50]
# Use append twice to add poolhouse and garage size (24.5 and 15.45)


# Print out areas


# Reverse the orders of the elements in areas


# Print out areas
```

6. Hoàn thành đoạn chương trình sau

```
# Definition of radius
r = 0.43
# Import the math package


# Calculate C= 2πr


# Calculate A= πr²
```

7. Hoàn thành đoạn chương trình sau

```
# Definition of radius
r = 192500
# Import radians function of math package


# Travel distance of Moon if 12 degrees. Store in dist.


# Print out dist
```

8. Hoàn thành đoạn chương trình sau

```
# Create list baseball
baseball = [180, 215, 210, 210, 188, 176, 209, 200]
# Import the numpy package as np


# Create a Numpy array from baseball: np_baseball
```

# Print out type of np_baseball

9. Hoàn thành đoạn chương trình sau

# Create list height (inch)

# Import numpy

# Create a Numpy array from height: np_height

# Print out np_height

# Convert np_height to m (Multiply np_height with 0.0254): np_height_m

# Print out np_height_m

10. Hoàn thành đoạn chương trình sau

# Create lists height(inch) and weight (pound)

# Calculate the BMI: bmi (inch->m:0.0254, pound->kg: 0.453592)

# Create the light array (bmi < 21)

11. Hoàn thành đoạn chương trình sau

# Create baseball, a list of lists

```
baseball = [[180, 78.4],
            [215, 102.7],
            [210, 98.5],
            [188, 75.2]]
# Import numpy


# Create a 2D Numpy array from baseball: np_baseball


# Print out the type of np_baseball


# Print out the shape of np_baseball
```

12. Simple arrays

Create a simple two dimensional array. First, redo the examples from above. And then create your own: how about odd numbers counting backwards on the first row, and even numbers on the second?Use the functions **len()**, **numpy.shape()** on these arrays. How do they relate to each other? And to the ndim attribute of the arrays?

13. Creating arrays using functions

- Experiment with arange, linspace, ones, zeros, eye and diag.
- Create different kinds of arrays with random numbers.
- Try setting the seed before creating an array with random values.
- Look at the function np.empty. What does it do? When might this be useful?

14. Simple visualizations

- Plot some simple arrays: a cosine as a function of time and a 2D matrix.
- Try using the gray colormap on the 2D matrix.