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Level: 1st year | Matter: **Scientific Computing with Python** | Duration: 1h30

Final Exam

Part I: Multiple Choice Questions (7.5 pts -- 0.5 each)

Choose the correct answer(s) for each question.

Q1 - **In Python, how do you define a function?**

A) function myFunc():	C) func myFunc():
B) def myFunc():	D) define myFunc():

Q2 - **How access the third element from the end of a list named "data "**

A) data[-3]	C) data(3)
B) data[-2]	D) data[len(data)-3]

Q3 - **Which of the following is a valid Python variable name?**

A) 1variable	C) my variable
B) my_variable	D) class

Q4 - **Which data structure stores key-value pairs in Python?**

A) List	C) Tuple
B) Set	D) Dictionary

Q5 - **Which Matplotlib submodule is most commonly used for plotting?**

A) matplotlib.chart	C) matplotlib.pyplot
B) matplotlib.plot	D) matplotlib.graph

Q6 - **How do you import NumPy with the alias 'np'?**

A) include numpy as np	C) use numpy np
B) import numpy as np	D) require numpy np

Q7 - **Given: def power(x, n=2): return x**n — what does power(5) return?**

A) 10	C) 25
B) 125	D) Error

Q8 - **Which instruction correctly creates an empty set in Python?**

A) s = {}	C) s = []
B) s = set()	D) s = ()

Q9 - **What does np.zeros((3, 4)) create?**

A) A 1D array of 12 zeros	C) A 4x3 matrix filled with ones
B) A 3x4 matrix filled with zeros	D) A 3D array

Q10 - **Which functions in Matplotlib pyplot are used to label the x-axis and y-axis respectively?**

A) plt.title() and plt.legend()	C) plt.axis_x() and plt.axis_y()
B) plt.xlabel() and plt.ylabel()	D) plt.label_x() and plt.label_y()

Q11 - **What does this expression return: [x for x in range(10) if x % 2 == 0]?**

A) [2, 4, 6, 8, 10]	C) [0, 1, 2, 3, 4]
B) [1, 3, 5, 7, 9]	D) [0, 2, 4, 6, 8]

Q12 - **Select the correct data types in Python?**

A) real (for decimal numbers)	B) int (for whole numbers)
C) bool (for True/False values)	D) number (for all numeric types)

Q13 - **What does the following code print?**

```
numbers = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
print(numbers[2:5])
```

A) [2,3,4,5]	C) [3,4,5]
B) [2,3,4]	D) [1,2,3,4]

Q14 - **What does np.empty(5) create?**

A) A 1-D array of five zeros: [0. 0. 0. 0. 0.]	C) A 1-D array with 5 uninitialized memory values (random/garbage values).
B) A 1-D array of five ones: [1. 1. 1. 1. 1.]	D) An empty Python list with no elements:[]

Q15 - **Which NumPy functions create arrays filled with a constant value?**

A) np.zeros(5)	C) np.ones(5)
B) np.empty(5)	D) np.array(5)

Part 2 : Exercises *(12.5 points)*

Exercise 1 : (2 points)

Define a function called rectangle_area(length, width) that returns the area of a rectangle. Also define a function rectangle_perimeter(length, width) that returns its perimeter. Call each function with length=8 and width=5 and display the results.

Exercise 2 : (4 points)

Using numpy and matplotlib libraries. Write Python code to plot the function f(x) = x^2 for x values from -5 to 5 (using np.arange(-5, 6, 1)). Add a title 'Quadratic Function', label the x-axis 'x' and the y-axis 'f(x) = x^2', and display the grid.

Exercise 3 : (2.5 points)

Write a Python program that displays the multiplication table of a given number (exemple from 7x1 to 7x10)

Exercise 4: (4 points)

Write a Python program using a loop that repeatedly asks the user to enter positive numbers. The program must continue until the total sum of the entered numbers reaches or exceeds 100. Finally, display a message indicating that the limit has been reached, as well as the list of all numbers entered by the user.

Good luck.