NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

Laboratory Manual
for
SC1003
Introduction to Computational Thinking and Programming

Practical Exercise #4:
Basic Python Programming -
Iterations

COLLEGE OF COMPUTING AND DATA SCIENCE

NANYANG TECHNOLOGICAL UNIVERSITY

Ex. #4 – Iteration

Learning Objectives

This lab manual provides hands-on exercises for learning and practicing iteration in programming using the context of the Battleships game. The exercises are designed to help you understand different types of loops, how to iterate through data structures, and how to apply iteration for problem-solving within the game mechanics.

Equipment and accessories required

PC/notebook with python compiler (eg python IDLE)

---

1. Iteration

Repeated execution of a set of statements is known as iteration. Iteration is used extensively in practical programs to repeat similar tasks, either for a specified number of times or until a condition is met.

There are two methods to perform iterations in Python: using the `while` statement and using the `for` statement. (Refers to LAMS module for detail and examples on how they can be used.)

Exercise 1. Setup:
Create a 10x10 grid to represent the Battleships game board.
Each cell in the grid should be initialized to 0, representing an empty space.

Exercise 2.While Loop Example: Repeatedly Prompting for Attack Coordinates
Objective: Use a while loop to continuously prompt the user for attack coordinates until a valid input is provided.

Scenario: The user must enter the coordinates of their attack on the game board, but you want to ensure the input is valid before proceeding.

Exercise 3: For Loop Example: Iterating Through the Game Board
Objective: Use a for loop to iterate through a 10x10 grid and print the state of each cell.

Scenario: You want to display the current state of the Battleships game board to the user.

If you are new to Python programming, copy the following hint code to your IDE, e.g., IDLE, follow the TODO task lists and sample output as follows to complete the exercises.

```
board_size = 10

# TODO : 1. Initialize a board_sizexboard_size game board with all
cells set to 0 (empty)
# Add you code of TODO 1 here


# TODO : 2.While loop to repeatedly ask for valid attack coordinates
# Add you code of TODO 2 here
```

Ex. #4 – Iteration

```
# TODO : 3. For loop to iterate through each row and column of the
board
# Add you code of TODO 3 here
```

Sample output:

```
Enter attack row (0-9): 7
Enter attack column (0-9): -1
Coordinates (7, -1) are valid: False
Please enter again
Enter attack row (0-9): 5
Enter attack column (0-9): 3
Coordinates (5, 3) are valid: True
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 1 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0
```