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ID NUMBER:

IST 1025: INTRODUCTION TO PROGRAMMING
MID-SEMESTER EXAM
Wednesday 24th February 2021, 17:30 – 19:30 (2 Hours)

Instructions **Total Marks: 30**

1. Enter your name and student identification number in the header.
2. Answer ALL questions.
3. In Question 1, indicate your selection by highlighting it like this.
4. In the case of programs, paste **screenshots** of the **code and output** in the space indicated.
5. Submit the document in **PDF**.

Question One **[10 Marks]**

1. Which of the following is NOT a valid variable name?
   A. `twoLength`
   B. `_length2`
   C. `2length`
   D. `All of the above.`

2. Which operation is calculated **first** in the following expression?
   `a * b ** c ** d - e`
   A. `c ** d`
   B. `a * b`
   C. `b ** c`
   D. `d - e`

3. To use the `sqrt` function from the `math` library, what do you write?
   A. `math import`
   B. `from sqrt import math`
   C. `from math import sqrt`
   D. `import sqrt`

4. Suppose x = 5 and y = 3.4. What happens when the following statement is executing?
   `result = x + y`
   A. Python converts y to an int first and then adds it to x.
   B. The addition takes place because floats and ints are compatible.
   C. The computation fails because you can't add operands of different types.
   D. Python converts x to a float first and then adds it to y.

5. What is the difference between `x == y` and `x = y`?
   A. There is no difference. They mean the same thing.
   B. The first one is an assignment and the second is a relational expression.
   C. The first one is a relational expression and the second one is an assignment.
   D. None of the above.

6. Which is the loop control variable in the following statement?
   `for number in range(n): print("Hello")`
   A. The keyword `for`.
   B. The values `0, 1, 2, …, n-1`.
   C. `n`
   D. `number`

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7. Which of the following is a docstring?
   A. `""" Area of a circle """`
   B. `" Area of a circle "`
   C. `' Area of a circle '`
   D. All of the above

8. Consider the following code segment. How would you describe the error in this code?

```
count = 1
while count <= 10:
    print(count, end = " ")
```

   A. The loop is off by 1.
   B. The loop control variable is not properly initialized.
   C. The comparison points the wrong way.
   D. The loop is infinite.

9. What does "short-circuit evaluation" mean with respect to the following expression?
   `2>0 and 4-5<0 and 3<2 and 3>1`
   A. It means that the evaluation stops when `3<2` is evaluated.
   B. It means that the evaluation stops when all the expressions have been evaluated.
   C. It means that the evaluation stops when `4-5<0` is evaluated.
   D. It means that the evaluation stops when `2>0`.

10. What does "short-circuit evaluation" mean with respect to the following expression.
    `2>0 or 4-5<0 or 3<2 or 3>1`
    A. It means that the evaluation stops after `3<2`.
    B. It means that the evaluation stops after all the expressions have been evaluated.
    C. It means that the evaluation stops after `4-5<0` is evaluated.
    D. It means that the evaluation stops after `2>0`.

Question Two [10 Marks]

1. Write a line of code that will produce the following output. [2 Marks]
   11 9 7 5 3

2. What is an indefinite loop? Give an example. [2 Marks]

3. What is a **sentinel**? Give an example. [2 Marks]

4. What is the role of the `continue` statement? Give an example. [2 Marks]

5. What is the role of the `sep` argument in a print statement? [2 Marks]

Answers to Question 2

1)
`for i in range(11, 2, -2):`
`    print(i, end=" ")`

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2) An indefinite loop is one for which the number of iterations is not known in advance. For example, the IT helpdesk does not know how many requests for help they will get on any given day. If their system uses a loop to record incidents, it has to be an indefinite loop.

3) A sentinel is a special value for stopping an indefinite loop. For example, a user is asked to enter values and enter a -1 to stop. The loop header can say while (value != -1) <body of loop>

4) The continue statement is used to skip the remainder of the loop body and go to the next iteration.

```
# Print i and i squred. But if i is even print i only.
for i in range(10):
    print(i, end=" ")
    if i % 2 == 0:
        continue
    print(i * i, end=" ")
```

5) When printing multiple items separated, the print function puts a space between them in the output. If this is not wanted, a different character can be specified using sep.

```
>>> print("one", "two", "three", sep=", ")
one, two, three
```

Question Three [10 Marks]

Refer to the program below and answer the questions that follow.

```
n = 5
f = 1
for i in range(1, n+1):
    f *= i
print("The result is", f)
```

1. What mathematical quantity does this program compute? [2 Marks]
2. Write a new version of the program using a while loop. [3 Marks]
3. Write a new version of the program that asks the user for the number n. It checks if the number is negative and prints an appropriate error message. Otherwise, it carries out the computation and then prints out the result using an f-string. [5 Marks]

Answers to Question 3

1. This program computes the factorial of n, that is 1 X 2 X 3 X … X n.

2.

```
n = 5
f = 1
i = 1
while i <= n:
    f *= i
    i += 1
print("The result is", f)
=== RESTART: C:/Users/LENOVO/Documents/A-IST1025/p
The result is 120
>>>
```

3.

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```
n = int(input("Enter an integer: "))
if n < 0:
    print("Error: The input cannot be negative.")
else:
    f = 1
    i = 1
    while i <= n:
        f *= i
        i += 1
    print(f"The result is {f}.")
```

```
=== RESTART: C:/Users/LENOVO/Documents/A-1
Enter an integer: -5
Error: The input cannot be negative.
>>>
=== RESTART: C:/Users/LENOVO/Documents/A-1
Enter an integer: 5
The result is 120.
```