**Assignment 1**

**Understanding Data and Expressions**

1. Identify which of the following are values and which are expressions:
   * \*
   * "Python"
   * 42.5
   * -
   * /
   * +
   * 9
2. Explain the difference between a **string** and a **variable** with an example.
3. List and describe three fundamental data types in Python. Provide an example for each.
4. What makes up an **expression** in Python? What is the purpose of expressions in a program?
5. Consider the statement: x = 20 + 5. Explain the difference between an **expression** and a **statement** in this case.
6. What will be the value of result after executing the following code? Explain your answer.

result = 15

result + 2

1. Predict the output of the following operations:
   * 'code' + 'crafters'
   * 'Python' \* 2
2. Why is apple a valid variable name while 123apple is not?
3. Name three functions that can be used to convert a value into an integer, a floating-point number, or a string. Provide examples.
4. Identify the issue in the following code and correct it:

"I have completed " + 5 + " Python assignments."

1. What is the difference between **immutable** and **mutable** data types in Python? Give one example of each.
2. How can you check the data type of a variable in Python? Provide an example.
3. What will be the output of the following code snippet? Explain why.

x = "5"

y = 2

print(x \* y)

1. What will happen if you try to add a string and an integer directly? How can you fix this issue?
2. Identify the type of each of the following values:
   * 25
   * "True"
   * False
   * 3.14
   * None
3. What will be the output of the following expressions?
   * 10 / 2
   * 10 // 2
   * 10 % 3
   * 2 \*\* 3
   * 4 + 3 \* 2 - 1
4. Explain **operator precedence** with an example.
5. What is the difference between the / and // operators in Python?
6. Write a Python expression that converts temperature from **Celsius to Fahrenheit** using the formula:

A number and equation on a white background

AI-generated content may be incorrect.

Test your expression with a value of 30°C.

1. Is the following variable name valid? Why or why not?

my-variable = 10

1. Why should we use **meaningful** variable names? Provide an example of a **poorly named variable** and a **well-named variable**.
2. What will happen if you try to use a **Python keyword** as a variable name? Try using def = 5 and observe the error.
3. What will be the output of the following code? Explain.

a = b = c = 10

print(a, b, c)

1. What is **dynamic typing** in Python? How does it differ from statically-typed languages like C or Java?

**Assignment 2**

**Boolean Logic and Control Flow**

1. What are the two Boolean values in Python? How are they written?
2. List three Boolean operators and explain their functions.
3. Construct a truth table for each Boolean operator (and, or, not).
4. Determine the outcome of the following expressions:
   * (10 > 3) and (2 == 4)
   * not (7 > 2)
   * (4 >= 4) or (8 < 2)
   * not ((9 < 10) or (3 != 3))
   * (True and False) or (not False)
5. List the six comparison operators used in Python.
6. Explain the difference between = and ==. Give an example where each would be used.
7. Identify the three logical blocks in the following code:

score = 80

if score >= 90:

print("Excellent")

elif score >= 50:

print("Good")

else:

print("Needs Improvement")

print("End of program")

1. Write a Python script that does the following:
   * If a variable status is 1, print "Welcome!".
   * If status is 2, print "Try Again!".
   * For any other value, print "Unknown Status".
2. What will be the output of the following code? Explain why.

a = 10

b = 20

if a and b:

print("Both are True")

else:

print("At least one is False")

1. What will be the output of the following code?

x = 5

y = 0

if x or y:

print("At least one is True")

else:

print("Both are False")

1. Rewrite the following if-else statement using a single-line conditional (ternary operator):

if age >= 18:

status = "Adult"

else:

status = "Minor"

1. Write a program that takes a user’s age as input and prints:

 "Child" if age is less than 12

 "Teenager" if age is between 12 and 17

 "Adult" if age is 18 or older

1. What will be the output of the following code? Explain step by step.

num = 7

if num % 2 == 0 and num % 3 == 0:

print("Divisible by both 2 and 3")

elif num % 2 == 0:

print("Divisible by 2")

elif num % 3 == 0:

print("Divisible by 3")

else:

print("Not divisible by 2 or 3")

1. What is **short-circuit evaluation** in Python? Provide an example.
2. What will be the output of the following boolean expressions? Explain why.

* True or False and False
* not True or False
* False and (True or True)

1. Write a Python program that takes a number as input and checks whether it is **positive, negative, or zero** using an if-elif-else statement.
2. What will the following code print? Explain the behavior of the not operator.

is\_raining = False

print("Take an umbrella!")

if not is\_raining else print("Enjoy the sunshine!")

1. Can an if-elif-else block work without the else part? If yes, explain how.
2. Modify the following code so that it correctly checks if a number is between 10 and 50 (both inclusive).

num = 25

if num > 10 or num < 50:

print("The number is in range")

else:

print("The number is out of range")

**Assignment 3**

**Loops and Iteration**

1. If your program is stuck in an infinite loop, what keyboard shortcut can you use to stop it?
2. Compare and contrast the break and continue statements. Provide an example of each.
3. Explain the difference between range(10), range(1, 10), and range(1, 10, 2).
4. Write a **for loop** that prints numbers from 5 to 15. Then, write an equivalent **while loop** that does the same.
5. If you have a function analyze() inside a module called data\_tools, how would you call it after importing the module?
6. Write a program that asks the user for a number and prints whether it is **even** or **odd** using an if-else statement.
7. Write a program that prints the **sum of all even numbers** between 1 and 50 using a loop.
8. Write a **while loop** that keeps asking the user to enter a number until they enter 0. Once 0 is entered, print "Program terminated" and exit.
9. What will be the output of the following code? Explain your answer.

for i in range(1, 6):

if i == 3:

break

print(i)

1. What will be the output of the following code? Explain your answer.

for i in range(1, 6):

if i == 3:

continue

print(i)

1. What is an **infinite loop**? Write an example of an **unintentional infinite loop** and explain how to fix it.
2. What is the purpose of the else block in a loop? Provide an example where an else block is used in a **for loop**.
3. Write a **nested loop** that prints the following pattern:

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1. Modify the above program to take user input for the number of rows in the pattern.
2. Write a loop that prints all numbers from **1 to 100**, but for multiples of **3**, print "Fizz" instead of the number, for multiples of **5**, print "Buzz", and for numbers that are multiples of both **3 and 5**, print "FizzBuzz".
3. How does the enumerate() function help in loops? Provide an example using a list.
4. How does the zip() function work in loops? Write a program that iterates over two lists simultaneously using zip().
5. Given the list numbers = [10, 20, 30, 40, 50], write a **for loop** that prints both the index and the value of each element using enumerate().
6. Write a program that counts how many vowels (a, e, i, o, u) are in a given user-input string.
7. Explain the difference between a **for loop** and a **while loop**. In what scenarios would you prefer using each?