Sapling (Basic-Intermediate)

December 6, 2024

0.0.1 Task 1 Class Practice Code: Conditional Statements and Loops

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Course Plan

1. **Conditional Statements**
   - `if`, `elif`, and `else`
   - Relational and logical operators
2. **Loops**
   - `for` loop for iterating over sequences
   - `while` loop for conditional iteration
   - Nested loops
3. **Combine Concepts**
   - Mini-project using conditional statements and loops

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[1]:
```
### **Practice Code**

#### **Task 1: Conditional Statements**
# Check if a number is positive, negative, or zero
num = int(input("Enter a number: "))

if num > 0:
    print("The number is positive.")
elif num < 0:
    print("The number is negative.")
else:
    print("The number is zero.")
```

```
Enter a number:  7

The number is positive.
```

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```
# Check if a number is even or odd
if num % 2 == 0:
    print("The number is even.")
else:
    print("The number is odd.")
```

```
The number is odd.
```

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```
#### **Task 2: For Loop**
# Print numbers from 1 to 10
print("Numbers from 1 to 10:")
for i in range(1, 11):
    print(i)
```

```
Numbers from 1 to 10:
1
2
3
4
5
6
7
8
9
10
```

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```
# Print the square of each number in a list
numbers = [2, 4, 6, 8]
print("Squares of the numbers:")
for num in numbers:
    print(num, "squared is", num ** 2)
```

```
Squares of the numbers:
2 squared is 4
4 squared is 16
6 squared is 36
8 squared is 64
```

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```
#### **Task 3: While Loop**
# Countdown from 5 to 1
count = 5
print("Countdown:")
while count > 0:
```

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    print(count)
    count -= 1
print("Blast off!")
```

```
Countdown:
5
4
3
2
1
Blast off!
```

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```
##### Sum of numbers until a negative number is entered
total = 0
while True:
    num = int(input("Enter a number (negative to stop): "))
    if num < 0:
        break
    total += num
print("Total sum:", total)
```

```
Enter a number (negative to stop):  -8

Total sum: 0
```

[7]:
```
#### **Task 4: Nested Loops**
# Multiplication table
print("Multiplication Table:")
for i in range(1, 6):
    for j in range(1, 6):
        print(i * j, end="\t")
    print()  # Newline after each row
```

```
Multiplication Table:
1       2       3       4       5
2       4       6       8       10
3       6       9       12      15
4       8       12      16      20
5       10      15      20      25
```

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0.0.2 Exercises

1. **Number Guessing Game**:
   - Write a program where the user guesses a randomly generated number between 1 and 20. Provide hints like "Too High" or "Too Low."
2. **FizzBuzz Problem**:

- Write a program to print numbers from 1 to 50.
- For multiples of 3, print “Fizz” instead of the number.
- For multiples of 5, print “Buzz.”
- For multiples of both 3 and 5, print “FizzBuzz.”

3. **Factorial Calculator**:
   - Write a program to calculate the factorial of a given number using a `while` loop.

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```
################################################################################
```

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## Exercise 1: Number Guessing Game
#A game where the user guesses a randomly generated number between 1 and 20.

import random

# Generate a random number between 1 and 20
secret_number = random.randint(1, 20)
attempts = 0

print("I have chosen a number between 1 and 20. Can you guess it?")

while True:
    guess = int(input("Enter your guess: "))
    attempts += 1

    if guess < secret_number:
        print("Too Low!")
    elif guess > secret_number:
        print("Too High!")
    else:
        print(f"Congratulations! You guessed it in {attempts} attempts.")
        break
```

```
I have chosen a number between 1 and 20. Can you guess it?
Enter your guess:  7
Too Low!
Enter your guess:  8
Too Low!
Enter your guess:  9
Too Low!
Enter your guess:  20
Too High!
Enter your guess:  15
```

```
Too Low!
Enter your guess:  11
Too Low!
Enter your guess:  12
Too Low!
Enter your guess:  10
Too Low!
Enter your guess:  16
Congratulations! You guessed it in 9 attempts.
```

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```python
### Exercise 2: FizzBuzz Problem
#A program to print numbers from 1 to 50 with special rules for multiples of 3 and 5.
for num in range(1, 51):
    if num % 3 == 0 and num % 5 == 0:
        print("FizzBuzz")
    elif num % 3 == 0:
        print("Fizz")
    elif num % 5 == 0:
        print("Buzz")
    else:
        print(num)
```

```
1
2
Fizz
4
Buzz
Fizz
7
8
Fizz
Buzz
11
Fizz
13
14
FizzBuzz
16
17
Fizz
19
```

```
Buzz
Fizz
22
23
Fizz
Buzz
26
Fizz
28
29
FizzBuzz
31
32
Fizz
34
Buzz
Fizz
37
38
Fizz
Buzz
41
Fizz
43
44
FizzBuzz
46
47
Fizz
49
Buzz
```

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[15]:
```python
### Exercise 3: Factorial Calculator
#A program to calculate the factorial of a given number using a `while` loop.

# Input a number from the user
num = int(input("Enter a number to calculate its factorial: "))

# Initialize variables
factorial = 1
counter = num

while counter > 0:
    factorial *= counter
    counter -= 1
```

```
print(f"The factorial of {num} is {factorial}")
```

```
Enter a number to calculate its factorial:  8
The factorial of 8 is 40320
```

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0.0.3 Practice

1. **Enhance the Number Guessing Game**:
   - Limit the number of attempts (e.g., 5).
   - Show the secret number if the user fails to guess correctly.
2. **FizzBuzz Variation**:
   - Accept the range (start and end) from the user instead of fixed numbers.
3. **Recursive Factorial**:
   - Implement the factorial calculator using a recursive function instead of a loop.

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