Tutorial 03

Part 01: Guided Programming Exercises

Simple Exercise

1. **If Statement:**
    - Write an **if** statement to check if a number is divisible by 5. If it is, print "Divisible by 5".
2. **Else Statement:**
    - Create a program using **if-else** to determine if a person is eligible to vote (age >= 18). Print appropriate messages for both conditions.
3. **Elif Statement:**
    - Use **if-elif-else** to categorize a number as 'Negative', 'Zero', or 'Positive'.
4. **Nested If-Else Statement:**
    - Write a nested if-else program that checks if a number is less than 10. If it is, check if it is even or odd and print the result.

Moderate Exercise

5. **If Statement:**
    - Create a program to check if a given year is a leap year.
6. **Else Statement:**
    - Write a program to determine whether a character entered is a vowel or consonant.
7. **Elif Statement:**
    - Develop a program that categorizes a character as 'Lowercase', 'Uppercase', 'Digit', or 'Special Character'.
8. **Nested If-Else Statement:**
    - Implement a nested if-else structure to calculate different types of discounts based on purchase amount: above 1000, 10% discount; between 500 and 1000, 5% discount; below 500, no discount.

Part 02: Unguided Programming Exercises [TO BE COMPLETED AND SUBMITTED TO BB]

Hard Exercise

Tax Calculator Based on Gross Income

- **Scenario:** In this simplified tax system, the income tax rates are as follows:
  - No tax for income up to £12,500.
  - 20% tax for income between £12,500 and £50,000.
  - 40% tax for income between £50,000 and £150,000.
  - 45% tax for income above £150,000.
- **Objective:** Write a Python program to calculate the tax owed based on the gross income input by the user. Then, calculate and display the net income after tax deductions.

- **Guidelines:**
  - Use selection statements (if-elif-else) to determine the tax bracket based on the user's gross income.
  - Calculate the tax owed for each bracket appropriately.
  - Subtract the tax from the gross income to find the net income.
  - Print the tax owed and the net income.
- **Sample Input/Output:**
  - If the user inputs a gross income of £60,000, the program should calculate the tax owed (£7,500 for the first £37,500 over £12,500 and £4,000 for the next £10,000) and display the net income (£48,500).

Task: Advanced Grade Calculation System

- **Scenario:** Create a program to calculate the final grade of a student based on weighted assessments. The grading system is as follows:
  - Coursework counts for 40% of the final grade.
  - Midterm exam counts for 25%.
  - Final exam counts for 35%.
- **Objective:** The program should prompt for the student's scores in coursework, midterm, and final exams. Then, calculate the weighted score for each component and the overall final grade.
- **Guidelines:**
  - Use selection statements to assign letter grades based on the final score: A (70-100), B (50-69), C (40-49), and F (<40).
  - Validate inputs to ensure scores are within reasonable ranges (e.g., 0-100).
  - Calculate the weighted score for each assessment.
  - Sum these scores to determine the final grade.
  - Display both the numeric final grade and the letter grade.

- **Sample Output:**
    - If a student scores 80 in coursework, 70 in the midterm, and 60 in the final exam, calculate and display the weighted final grade and corresponding letter grade.

Quizzes:

1. What is the output of **if 0: print("Yes") else: print("No")**?
    - A) Yes
    - B) No
    - C) Error
    - D) Nothing
    -
2. What does the following code output? **x = 5 if x > 10: print("A") elif x == 5: print("B") else: print("C")**
    - A) A
    - B) B
    - C) C
    - D) No output
    -
3. Determine the result of **if False: print("True") else: print("False")**.
    - A) True
    - B) False
    - C) Error
    - D) Nothing
    -
4. If **a = 4**, what will **if a < 5: print("Hello") if a % 2 == 0: print("Even") else: print("Odd")** output?
    - A) Hello
    - B) Even
    - C) Hello Even
    - D) Syntax Error
    -
5. What does **if not 1: print("False") else: print("True")** print?
    - A) False
    - B) True
    - C) Error
    - D) Nothing
    -
6. Evaluate the output: **age = 20; if age > 18: print("Adult") if age > 30: print("Senior") else: print("Young Adult")**
    - A) Adult
    - B) Senior
    - C) Young Adult
    - D) Adult Young Adult
    -
7. What is the result of **if 3 + 2 == 5: print("Five") else: print("Not Five")**?
    - A) Five
    - B) Not Five
    - C) Error
    - D) Nothing

8. Determine the output: **num = 10; if num < 20: print("Less") elif num > 10: print("Greater") else: print("Equal")**
    - A) Less
    - B) Greater
    - C) Equal
    - D) Less Greater
    -
9. What does **x = -1 if x > 0: print("Positive") elif x < 0: print("Negative") else: print("Zero")** output?
    - A) Positive
    - B) Negative
    - C) Zero
    - D) Error
    -
10. If **a = 5**, what will **if a > 3: print("One") if a < 10: print("Two") else: print("Three")** output?
    - A) One
    - B) Two
    - C) One Two
    - D) Three
    -
11. What is the result of **if True or False: print("Yes") else: print("No")**?
    - A) Yes
    - B) No
    - C) Error
    - D) Nothing
    -
12. Evaluate the output: **score = 75 if score > 80: print("A") elif score > 70: print("B") else: print("C")**
    - A) A
    - B) B
    - C) C
    - D) No output
    -
13. What does **if 1 == 1 and 2 == 2: print("Correct") else: print("Incorrect")** print?
    - A) Correct
    - B) Incorrect
    - C) Error
    - D) Nothing
    -
14. If **x = 15**, what will **if x > 10: print("Greater") elif x < 20: print("Less") else: print("Equal")** output?
    - A) Greater
    - B) Less
    - C) Equal
    - D) Greater Less

15. Determine the result of **if not True: print("False") else: print("True")**.
    - A) False
    - B) True
    - C) Error
    - DNothing
    -
16. What is the output of **if "": print("Empty") else: print("Not Empty")**?
    - A) Empty
    - B) Not Empty
    - C) Error
    - D) Nothing
    -
17. Evaluate the output: **x = 0; if x: print("Non-zero") else: print("Zero")**
    - A) Non-zero
    - B) Zero
    - C) Error
    - D) No output
    -
18. What does **if "hello": print("Yes") else: print("No")** print?
    - A) Yes
    - B) No
    - C) Error
    - D) Nothing
    -
19. If **num = 15**, what will **if num % 5 == 0: print("Divisible by 5") else: print("Not Divisible")** output?
    - A) Divisible by 5
    - B) Not Divisible
    - C) Error
    - D) Nothing
    -
20. Determine the result of **if 5 > 10 or 4 < 8: print("True") else: print("False")**.
    - A) True
    - B) False
    - C) Error
    - D) Nothing
    -
21. What is the output of **a = 5; if a > 10: print("Greater") elif a == 5: print("Equal") else: print("Smaller")**?
    - A) Greater
    - B) Equal
    - C) Smaller
    - D) No output
    -
22. Evaluate the output: **if not(1 == 1): print("True") else: print("False")**
    - A) True
    - B) False
    - C) Error
    - D) Nothing

23. What does **if 3 < 5 < 7: print("In Range") else: print("Out of Range")** print?
    - A) In Range
    - B) Out of Range
    - C) Error
    - D) Nothing
    -
24. If **x = 10**, what will **if x < 5: print("Low") elif x <= 10: print("Medium") else: print("High")** output?
    - A) Low
    - B) Medium
    - C) High
    - D) Low Medium
    -
25. Determine the result of **if "False": print("True") else: print("False")**.
    - A) True
    - B) False
    - C) Error
    - D) Nothing
    -
26. What is the output of **if -1: print("True") else: print("False")**?
    - A) True
    - B) False
    - C) Error
    - D) Nothing
    -
27. Evaluate the output: **x = 5; if x: print("Non-zero") else: print("Zero")**
    - A) Non-zero
    - B) Zero
    - C) Error
    - D) No output
    -
28. What does **if 10 > 5 and 8 > 10: print("Correct") else: print("Incorrect")** print?
    - A) Correct
    - B) Incorrect
    - C) Error
    - D) Nothing
    -
29. If **age = 18**, what will **if age >= 18: print("Adult") if age > 21: print("Over 21") else: print("Under 21")** output?
    - A) Adult
    - B) Over 21
    - C) Under 21
    - D) Adult Under 21
    -
30. Determine the result of **if not 0: print("Zero") else: print("Non-zero")**.
    - A) Zero
    - B) Non-zero
    - C) Error
    - D) Nothing