PRACTICE QUESTIONS FOR STUDENTS

1) Write a simple algorithm for finding the maximum of three numbers using pseudo code.

ANSWER

```
Start
  Input: num1, num2, num3
  Output: maxNum
    if num1 >= num2 and num1 >= num3 then
      maxNum = num1
    else if num2 >= num1 and num2 >= num3 then
      maxNum = num2
    else
      maxNum = num3
    end if
    Display maxNum
End
```

2) Compare and contrast two different programming languages, highlighting their strengths and weaknesses.

ANSWER

Comparison of Two Programming Languages: Python and C++

Python

Strengths:

- **Ease of Learning and Use:** Python has simple syntax which makes it easy to read and write.
- **Dynamic Typing:** No need to declare variable types.
- **Rich Libraries:** Extensive standard library and numerous third-party libraries for various applications.
- **Cross-Platform:** Can run on various operating systems without modification.

Weaknesses:

- **Performance:** Slower execution compared to compiled languages due to its interpreted nature.
- **Memory Consumption:** Higher memory usage because of dynamic typing.
- **Less Control:** Offers less control over system resources and hardware compared to lower-level languages.

C++

Strengths:

- **Performance:** High performance due to compiled nature and better control over system resources.
- **Memory Management:** Offers manual memory management which can be optimized.
- **Object-Oriented:** Supports object-oriented programming features like classes and inheritance.

Weaknesses:

- **Complexity:** More complex syntax and concepts (e.g., pointers) making it harder to learn.
- **Compilation Time:** Code needs to be compiled before running which can slow down the development process.
- **Portability Issues:** Platform-specific code can limit portability across different operating systems.

3) Explain the compilation process and how it differs from interpretation.

ANSWER

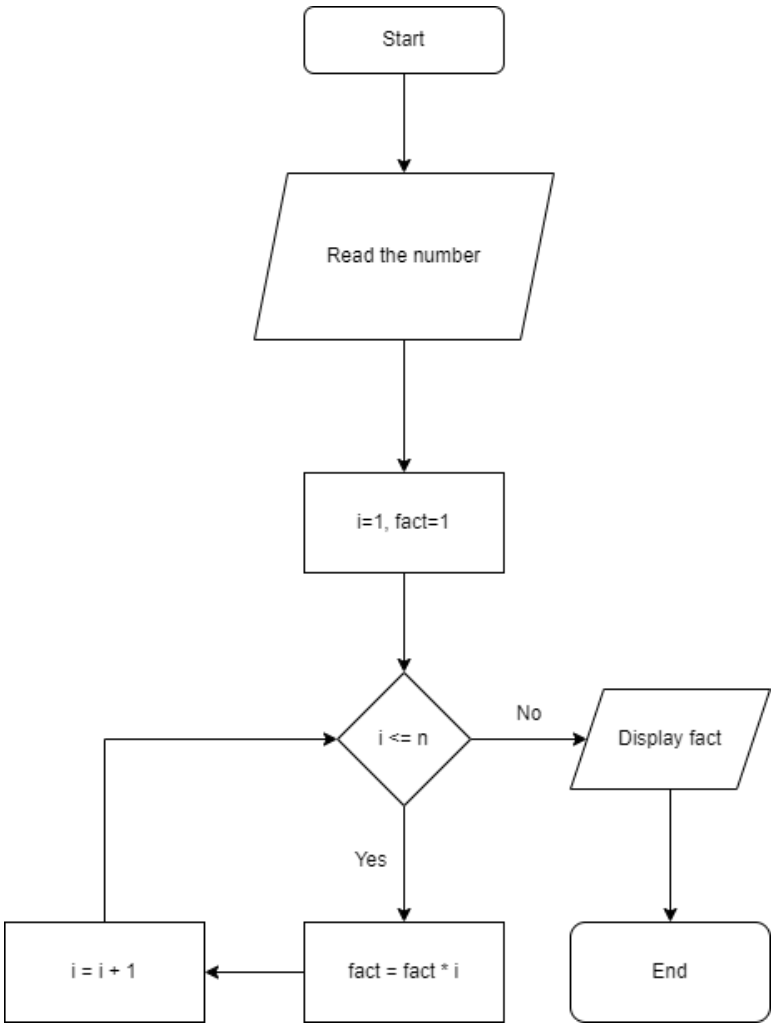
Compilation is a multiple step process in which the source code is written in a high-level programming language and is translated into machine code that can be executed by a computer's processor.

Feature	Compilation	Interpretation
Translation Method	Translates entire source code to machine code before execution.	Translates and executes source code line by line.

Execution	Executes the compiled machine code.	Directly executes the source code using an interpreter.
Speed	Faster execution after compilation.	Slower execution due to line-by-line interpretation.
Error Handling	Errors are reported after the entire compilation process.	Errors are reported line by line during execution.
Memory Usage	Generally uses less memory at runtime.	May use more memory at runtime due to interpreter overhead.
Examples of Languages	C, C++, Rust, Go	Python, Ruby, JavaScript, PHP

4) Create a flowchart for a program that calculates the factorial of a given number.

ANSWER



5) Write a function in your preferred programming language to calculate the area of a rectangle.

ANSWER

```
def calculate_area(length, width):
    return length * width
length = int(input())
width = int(input())
area = calculate_area(length, width)
print("The area of the rectangle is ", area)
```