**Problem Solving: The Software Development Method**

Programming is a problem-solving activity. To develop software, software developers use the software development method:

1. Specify the **problem requirements**
2. **Analyze the problem**: Usually this involves determining whether the problem is computer solvable or not. If the problem can be solved, determining the required inputs, the user interface, the required processing, and the required outputs.
3. **Design the algorithm** to solve the problem.
4. **Implement the algorithm** in the required programming language.
5. **Test and verify** the completed program.
6. **Maintain and update** the program.

**What is a computer algorithm?**

A computer algorithm is an unambiguous, finite, ordered sequence of steps that instructs a computer what to do to solve a computer solvable problem and which, if implemented and executed, solves the problem in a finite amount of time.

**What is a computer program?**

A computer program is an implementation of a computer algorithm in a particular programming language.

Step 3 of the software development method, designing an algorithm, should be done at a higher level independent of the implementation programming language. Usually a **“pseudo code”** language that has no strict syntax rules is used. If the implementation programming language is Object Oriented like Java, this step involves determining objects and the behaviour of those objects.

In the following pseudo code example, we assume that the problem to be solved can be solved in a single class that contains the main method.

Write the analysis and a pseudo code algorithm for a program that prompts for and reads two values. It then finds and displays: the sum, the product, and the square root of the sum of squares of the two values.

**Analysis:**

**Input:** Two numbers num1, num2

**Input restrictions:** None

**Constants:** None

**Formulas**: sum ← num1 + num2, product ← num1 \* num2, sqrtSumSquares ←

**Output:** sum, product, sqrtSumSquares

**Pseudocode Algorithm**:

1. Prompt for the first value num1
2. Input: num1
3. Prompt for the second value num2
4. Input: num2
5. Compute the sum:

sum ← num1 + num2

1. Compute the product:

product ← num1 \* num2

1. Compute the square root of the sum of squares:

sqrtSumSquares ←

1. Output: sum, product, and sqrtSumSquares
2. Stop.

After writing the pseudo code algorithm you translate it into a particular programming language:

public class MathComputations{

public static void main(String[] args){

double num1, num2, sum, product, sqrtSumSquares;

// System.out.println("Enter first number: ");

num1 = 3.0; // to be replaced by input statement

// System.out.println("Enter second number: ");

num2 = 4.0; // to be replaced by input statement

sum = num1 + num2;

product = num1 \* num2;

sqrtSumSquares = Math.sqrt(num1\*num1 + num2\*num2);

System.out.println("sum = " + sum);

System.out.println("product= " + product);

System.out.println("Sqrt of sum squares = " + sqrtSumSquares);

}

}

Finally, test the program using different values of **num1** and **num2**.