Project_2

Computational Thinking - Solving a Diophantine Equation

$$x^2 + y^2 = 25$$

How Did I Use Python to Solve This?

I developed an interactive script that assists the user with input validation, domain verification, and mathematical calculations.
I imported the math module to access functions like **sqrt()** and **pow()** for solving the equation.
"While" loops in Python are used to repeat a block of code as long as a given condition remains true. So, I used a while loop to keep the program running until the user decides to exit.
Input validation is handled with a try-except code block to ensure the user enters an integer.
A nested loop checks that if the input is within the domain.
Once a valid **x** is entered, program calculates **y** using the rearranged form of the equation.
Then program compares the exact **y** value with its rounded version to three decimal points, and format the output to show both values and their difference.
Program outputs integer values for the numbers with no difference to their rounded values.
Unicode characters like superscript ² and ± are used to make the terminal output more readable, logical and mathematically expressive.
Finally, the program prompts the user to continue or exit.

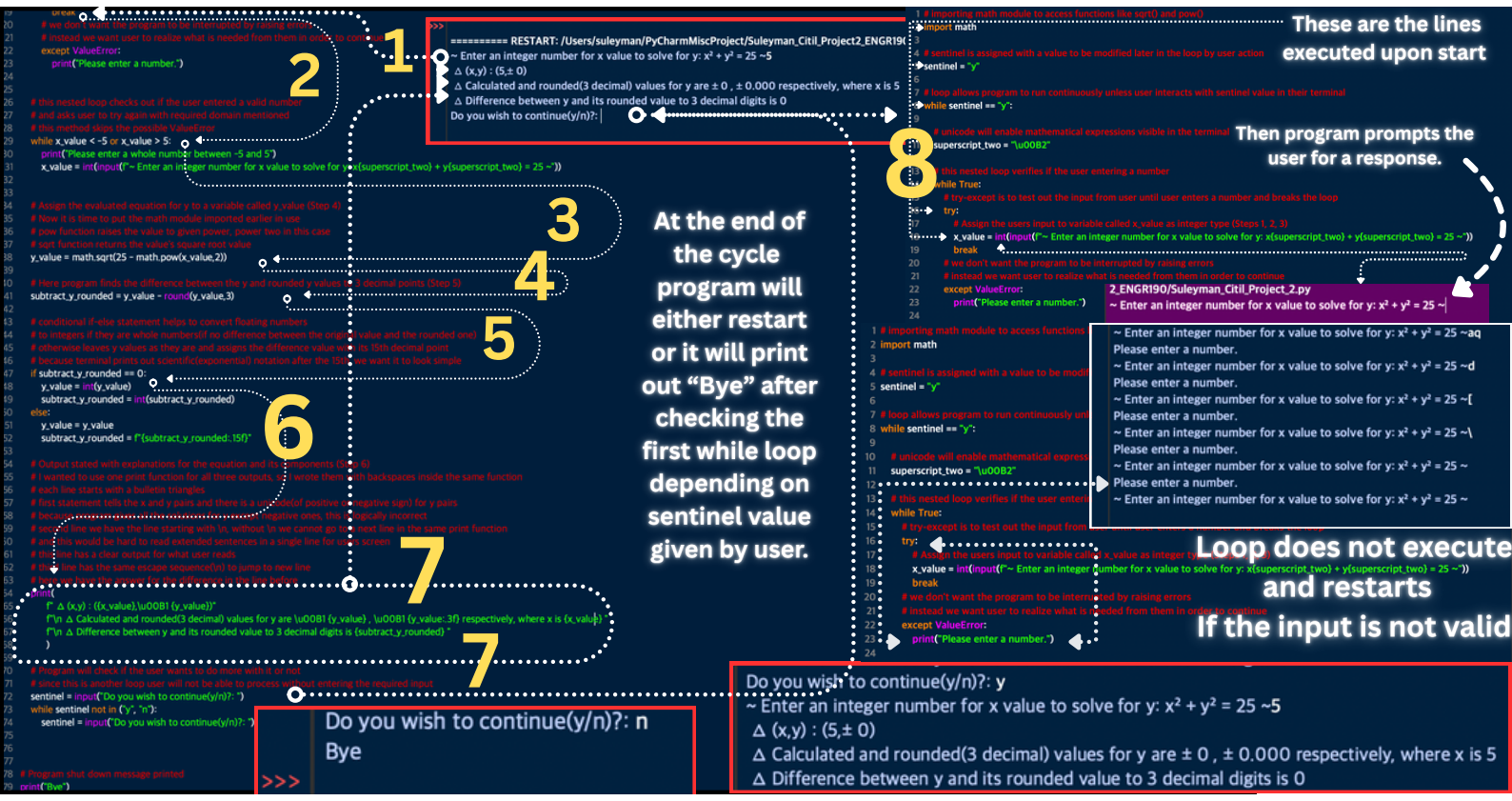

Figure : Starting from top right corner image, indicates how the program starts progressing and points at the later cycle with the step numbers.
Figure also includes an example of invalid entry and its result at the right end. Bottom red framed windows indicates the end of the cycle behavior with prompt.

What Values of **X** And **Y** Worked As Integer Solutions?

X : 0 , ±3, ±4, ±5

Y : ±5 , ±4, ±3, 0

Program converts the solution to an integer only if no difference in between **Y** and **Y-Rounded**.

How Did The Math Module Help You In Your Calculations?

Math module allows me to use functions like **pow()** and **sqrt()**.
The code is more readable.

Why Did You Print In The Format You Did?

I wanted the format to be neat and clear for what the user is going to interact with.
Specifically, I wanted to clear up how their entries are presented.
For example, the program starts with explaining that it is going to compute the given mathematical expression by using the input value from the user.
This way, the user knows what is expected from them and what they might expect from the program. Then the result section has clear triangle shaped bulletins to highlight the very calculations.

What Did You Notice About The Difference Between **Y** And The **Rounded-Y**?

There are no differences when user enters **" 5, 4, 3, 0, -3, -4, -5 ".**
There are differences if the user enters **"1, 2, -2, -1".**

What, If Anything, Did You Learn About Connecting Math Concepts And Programming

Programs run considerably faster and more efficiently than humans, as long as there are no errors in the code's structure. As a result, humans can utilize these programs to carry out intricate calculations almost instantaneously. This ability empowers humanity to address the most difficult challenges and rapid advancement in technology and science of our era.