Quiz #2

LabVIEW　　　　　　　　　　　　　　　　　　　　　　　　Dr. Pogo

Assignment is due "in class" on Thursday, September 21, 2023.

Quiz #2: String Manipulation

Inputs: One "stop" button.
Three numeric controls (A, B, C)

Outputs: Two string indicators for roots

Operation: You may download my "baseplate" to use as a starting point.

The user can adjust the values of the three numeric controls. LabVIEW will continuously solve the quadratic equation $Ax^2 + Bx + C = 0$, and display both roots x_1 and x_2. Each of the two roots will be displayed using separate string indicators. Some roots will be real, some will be complex, and others will be imaginary. For example, an individual root might be: "4.00 + 2.00i".
As a refresher, the solution to this equation varies depending on whether any of the coefficients are zero. Here are the six cases to consider:

I. A & B & $C \neq 0$	$\rightarrow x_1 = \frac{-B}{2A} + \frac{\sqrt{B^2 - 4AC}}{2A}$,	and $x_2 = \frac{-B}{2A} - \frac{\sqrt{B^2 - 4AC}}{2A}$
II. $A = 0$, B & $C \neq 0$	$\rightarrow x_1 = \frac{-C}{B}$,	and $x_2 =$ none
III. $A = 0$, $B = 0$	$\rightarrow x_1 =$ none,	and $x_2 =$ none
IV. $B = 0$, A & $C \neq 0$	$\rightarrow x_1 = +\sqrt{\frac{-C}{A}}$,	and $x_2 = -\sqrt{\frac{-C}{A}}$
V. B & $C = 0$, $A \neq 0$ or A & $C = 0$, $B \neq 0$	$\rightarrow x_1 = 0$,	and $x_2 =$ none
VI. $C = 0$, A & $B \neq 0$	$\rightarrow x_1 = \frac{-B}{A}$,	and $x_2 = 0$

In the Baseplate, cases are ordered from easiest to hardest. After fixing each "compound arithmetic" node on the left, go to the "False" window of the upper case, and work your way down the screen. Only cases I and IV can potentially have complex solutions. You may not use the LabVIEW complex variable type. A few common output errors look like this 3.0 ++ 2.0i; 3.0 + –2.0i; 3.0 + 2.0; 3.0 + 0.0i; nan.