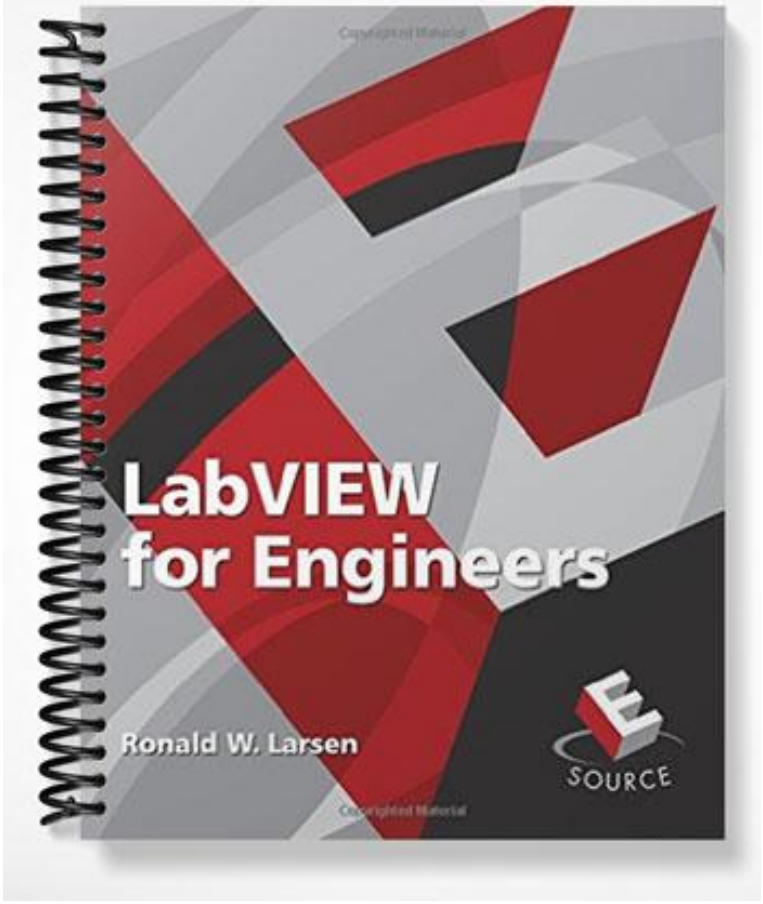
SOLUTIONS MANUAL



Solutions Manual
LabVIEW for Engineers

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1 Introduction

There are no Problems in Chapter 1.

2 LabVIEW Basics

1. Use LabVIEW's Square and Square Root functions to create a VI (similar to the VI shown in **Error! Reference source not found.**) that will accept a value, compute the square of the value and the square root of the value, and display the results. What happens when X = 0 and X < 0?

SOLUTION

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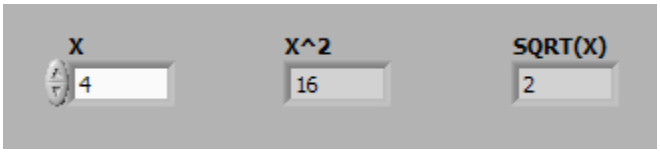
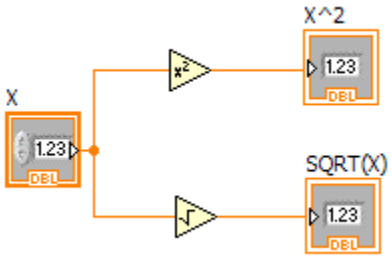
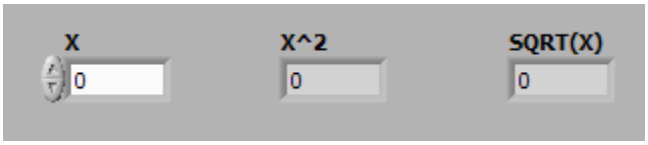
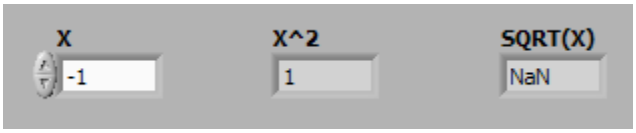


Block Diagram



Answers to question: What happens when X = 0 and X < 0?

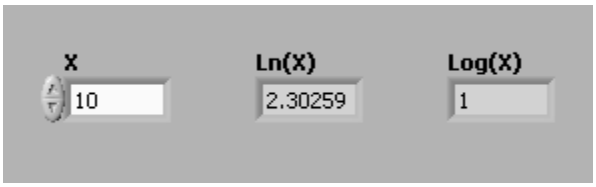




2. Use LabVIEW's Natural Log and Base-10Log functions to create a VI (similar to the VI shown in **Error! Reference source not found.**) that will accept a value, compute the logarithms, and display the results. What happens when X = 0 and X < 0?

SOLUTION

Front Panel



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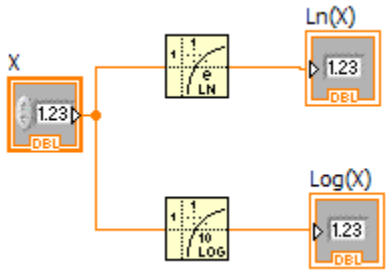
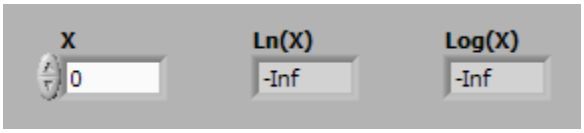
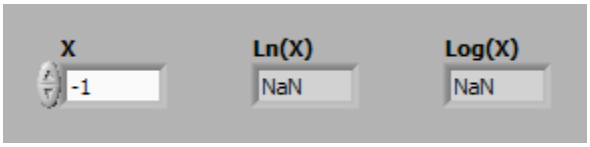


Answers to question: What happens when X = 0 and X < 0?

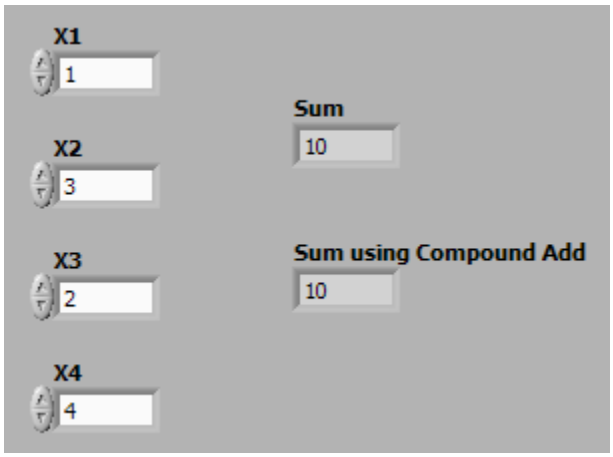




3. Create a VI that has four numeric controls and displays the sum of the four values.
    a. Use several Add functions to compute the sum.
    b. Use LabVIEW's Compound Arithmetic function to compute the sum.

SOLUTION

Front Panel



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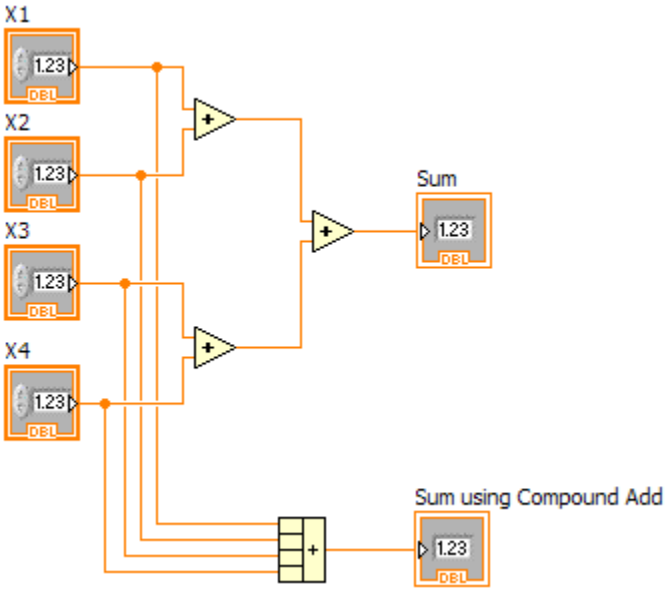


4. Write a quadratic equation solver that will accept values for A, B, and C, defined by

$$Ax^2 + Bx + C = 0$$

and then compute both quadratic solutions (one solution using the plus symbol, the other using the minus symbol in the following equation.)

$$x = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$$

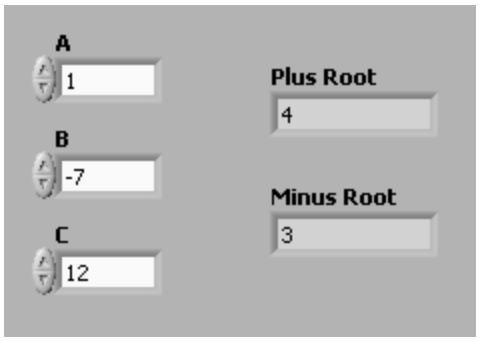


Figure 2.1. Solving quadratic equations

Test your VI with the coefficients shown in Figure 2.1. When it is working, solve the following quadratic equations:

a. $2x^2 - 2x - 4 = 0$
b. $x^2 - 1.7x - 4.8 = 0$
c. When 4AC > B^2, there is a negative number inside the square root operator. This is the case for equations such as

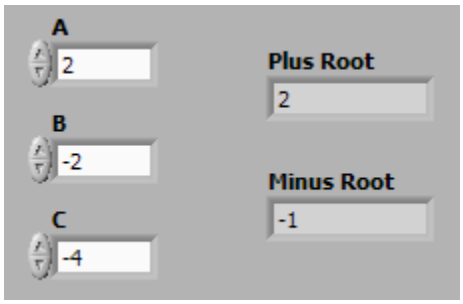
$$2 + x + 2x^2 = 0$$

What does LabVIEW show as the solutions to this equation?

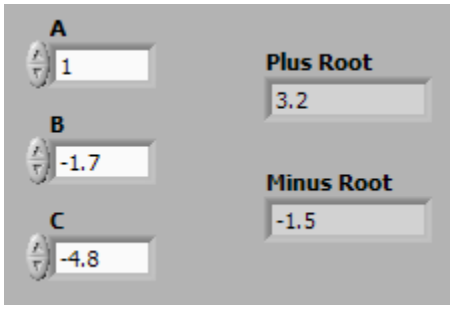
SOLUTION

Front Panels

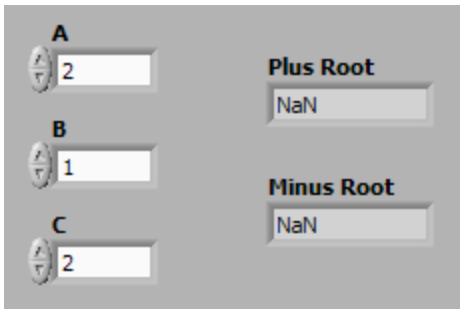
a.



b.



c.



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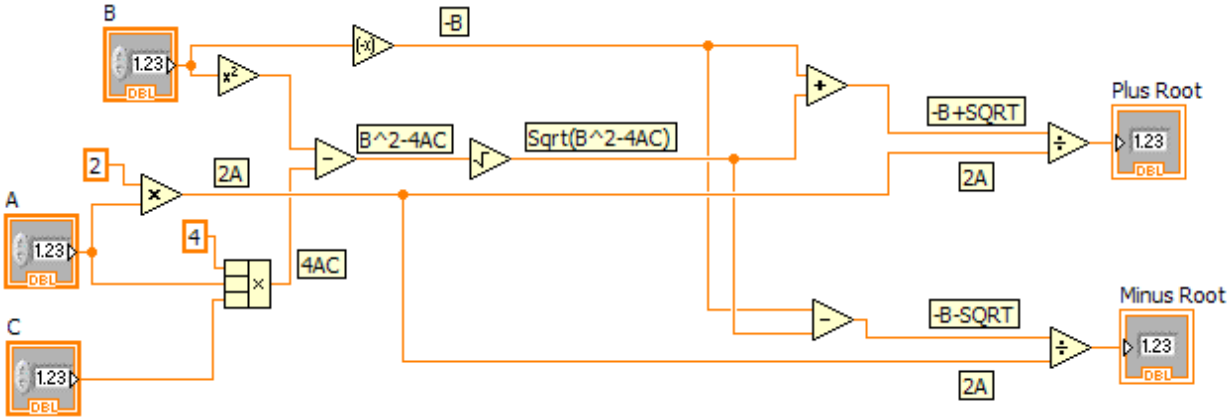
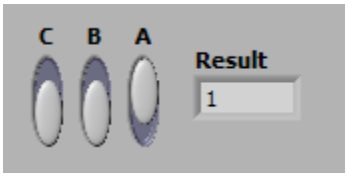


5. LabVIEW provides a function that converts a Boolean (True, False) value into a 1 or 0. Create a VI and use it to determine the decimal value equivalent to the following binary numbers:
   a. 001 (C is off, B is off, A is on)
   b. 010
   c. 101

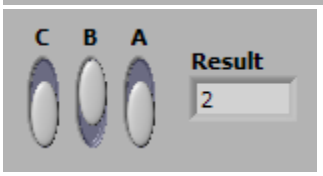
SOLUTION

Front Panels

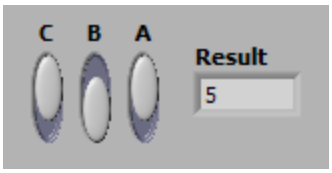
a.



b.



c.



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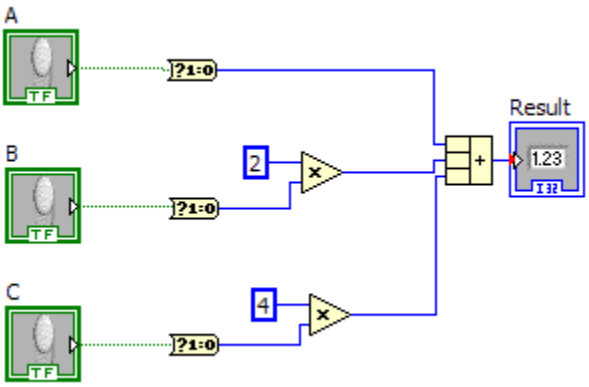

b. Modify your VI to handle four-bit binary numbers by adding another switch.

SOLUTION

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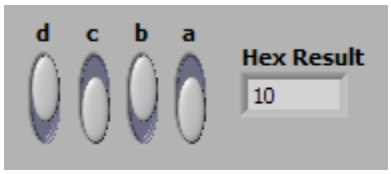

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