Engin 103 March 27, 2008 back to e-syllabus	Topics: CW7 Circuit Analysis with LabVIEW IV Logbook questions

Engineering 103 –UMass Boston

CW 7

(In-Class-Work 7)

Circuit Analysis with LabVIEW IV: Follow Instructions in today's class notes, produce a VI that solves a circuit with one battery and six resistors, producing four outputs: total current I, and voltages V2, V4, and V6, now using three **subVI**'s: "parallel", "V_next", and "I_after"

By alphabetical order of the last names, the first two students in each team will submit LabVIEW LLB file cw7_XX_a.llb, the next two students will submit LabVIEW LLB file cw7_XX_b.llb, to the *files* folder in the server. Each LLB file should contain one VI's corresponding to this CW. Please insert names and dates within the Front Panels. These files need to be uploaded to the server today to receive credit.

*Remember that this is an individual work (turn it in, as instructed, with your name and date). Home-works and class-works count 20% toward the course grade. Class-works are done in class.

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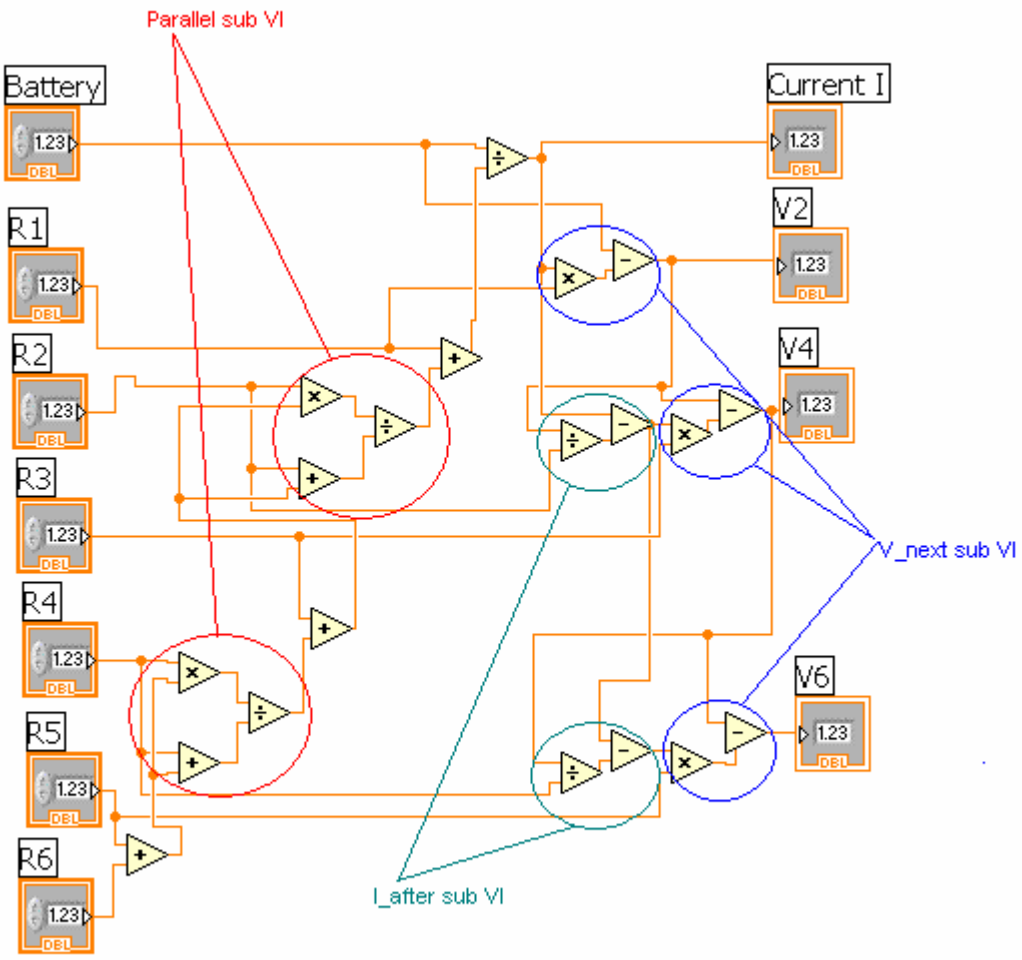
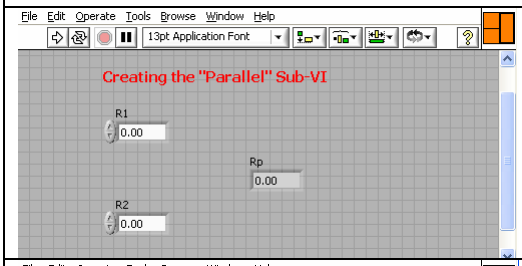
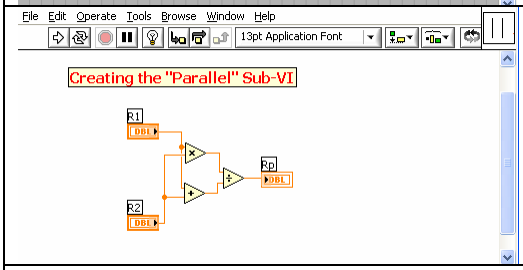
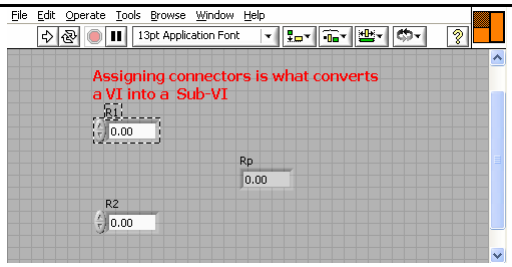
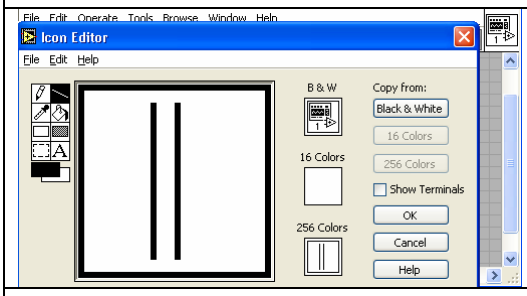
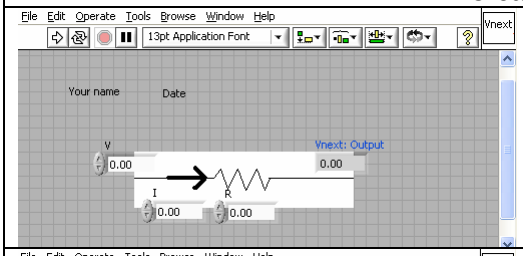
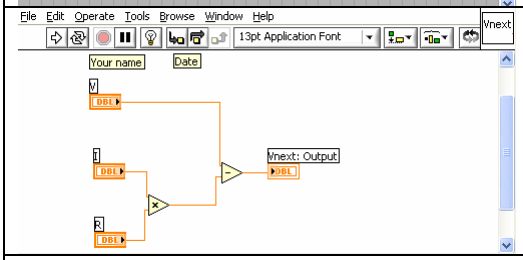
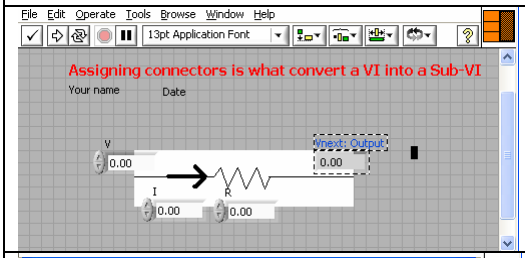
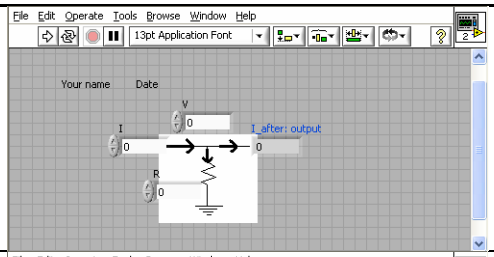
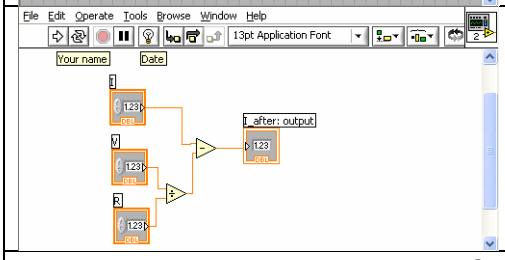
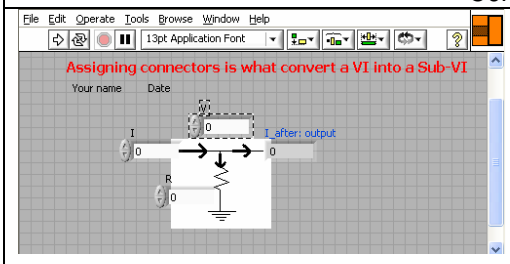
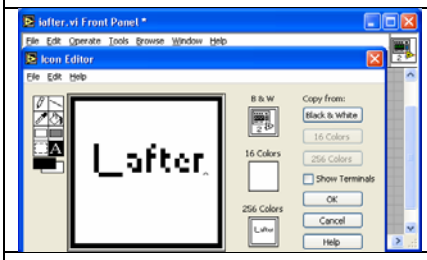
Circuit Analysis with LabVIEW IV (See also the link with the same name in the e-syllabus)

If you observe the Block Diagram in the Virtual Instrument we built for Circuit Analysis with LabVIEW III, there are three repeating groups of operations as shown in the figure below. For each group we will create a sub-VI that we will call in every time we need to perform that same group of operations. Sub-VI's, subroutines, or super operators are commonly used in programming languages, with the goals of simplifying the codes for reading and debugging.

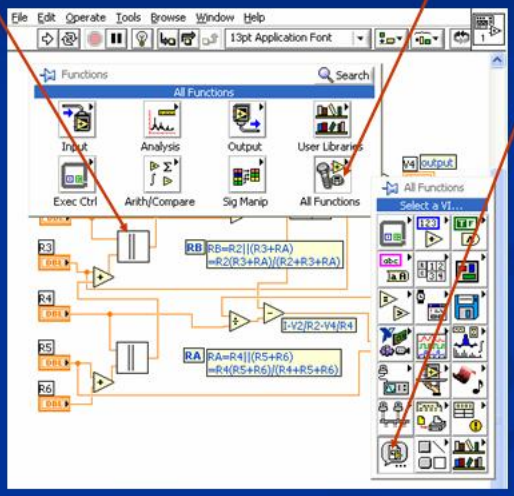


Creating the Parallel subVI	
	(a) Place two numeric controls labeled as R1 and R2, and one indicator as Rp into the Front Panel
	(b) In the Block Diagram produce Rp using the formula: Rp= (R1*R2)/(R1+R2)
Converting a VI into a subVI	

<table>
<tr><td> 
</td><td>(a) Right click on the icon, select Show Connectors, then pair the left connectors with numeric controls (by right clicking on one and another consecutively) and the right ones with numeric indicators</td></tr>
<tr><td> 
</td><td>(b) Double click on the icon, use dotted rectangle to select icon contents, then hit backspace to delete. Use line to draw two vertical bars to represent the Parallel subVI. Then click OK.</td></tr>
<tr><td colspan="2">Creating the Vnext subVI</td></tr>
<tr><td> 
</td><td>(a) As with the Parallel subVI, we start creating the VI by placing three numeric controls labeled as V, I, and R, and one numeric indicator as Vnext</td></tr>
<tr><td> 
</td><td>(b) In the Block Diagram, Vnext is given by the expression:
Vnext = V – I*R</td></tr>
<tr><td colspan="2">Converting a VI into a subVI</td></tr>
<tr><td> 
</td><td>(a) To convert the Vnext VI into a subVI connectors are assigned as with the Parallel subVI. Use “Patterns” to select the correct number of input and output terminals on the left and right, respectively</td></tr>
<tr><td> 
</td><td>(b) And the icon is edited to indicate its function</td></tr>
<tr><td colspan="2">Creating the I_after subVI</td></tr>
</table>

<table>
<tr><td> 
</td><td>a) The subVI can be created by inserting the inputs I, V, R as numeric controls and output I_after as numeric indicator, in the Front Panel.</td></tr>
<tr><td> 
</td><td>b) Then connecting them together in the Block Diagram according to
I_after = I – V/R</td></tr>
<tr><td colspan="2">Converting it into a subVI</td></tr>
<tr><td> 
</td><td>a) Right-click on icon, Show Connector, then pair Front Panel's elements with connectors on icon by clicking on the element then on its corresponding connector in the icon.</td></tr>
<tr><td> 
</td><td>b) The icon can be edited to indicate its function by using the Dotted Rectangle (to select)/Backspace (to delete) /A (text box). Then type in "I_after" and click OK.</td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="2">How to call in a subVI</td></tr>
</table>

To call in a subVI you created to perform a group of operations (e.g. the Parallel subVI), right-click within the Block Diagram, All Functions/Select a VI. Then wire its terminals (defined during the process of assigning connectors) to the rest of the circuit.



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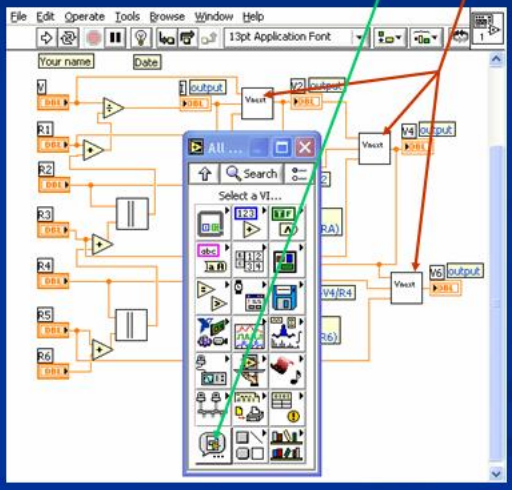
For Circuit III with subVI's, repeat the same steps to insert the Vnext subVI: right-click within the Block Diagram, All Functions/Select a VI. Then wire its terminals (defined during the process of assigning connectors) to the rest of the circuit.



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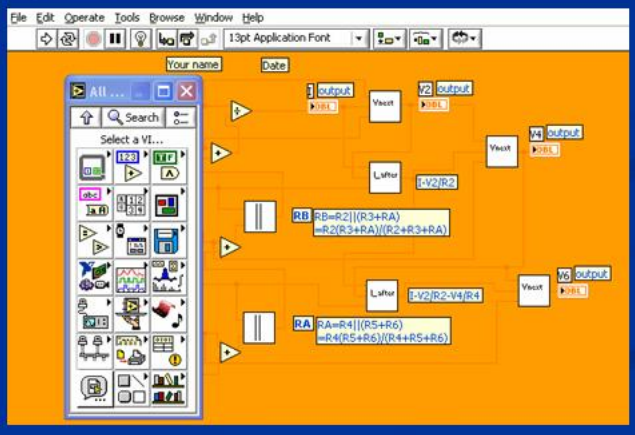
What the Block Diagram for Circuit Analysis III with subVI would look like?

The Block Diagram for Circuit III when the three subVI's (Parallel, Vnext, I_after) are used contains only 11 operators now. This illustrates the purpose of using subVI's (or subroutines), that is, to simplify the reading of a code, it is easier to pinpoint and fix an error. Also, in a graphical programming language, such as LabVIEW, the interconnections between a subroutine and other elements in the code are easy to see.



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LOGBOOK: example of a logbook page

-Use a quadrille notebook; number all pages; date all entries
-Write your notes for all activities, thoughts, problems and solutions, and learning conclusions related to Engin 103. You should write down progress, outcomes, and conclusions on projects and teamwork; conclusions from class work (including LabVIEW) and homework.
-In addition you should answer in the logbook all questions listed in these notes in blue, as shown below:

29) How many sub-VI's did you create in this exercise? What is the difference between creating a VI and creating a sub-VI?
30) How do you call in a sub-VI? How do you wire it? What would happen if you did not properly assign connectors when creating the sub-VI?

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