

# Chapter 1. Using a VI as a SubVI

## 1.1 What is a SubVI?

- A SubVI is a stand VI that can be called by other VI.

The SubVI is similar to an individual function. Using SubVI is an efficient programming skill in that it allows you to use the same code in different situations, and make your main VI program clear and compact.

## 1.2 You can create a SubVI from an existing VI with the procedure:

- Create the inputs and outputs of the SubVI.
- **Define which terminal is used as input/output, and** this allows to send data to the SubVI and receive data from the SubVI.
- Edit the SubVI icon so that the icon has different appearance.
- Finally, save you SubVI on your disk.

### 1.3. An Example

Three parameters associated with a circle of given radius are circumference, diameter, and area. For a radius  $r$ , we have

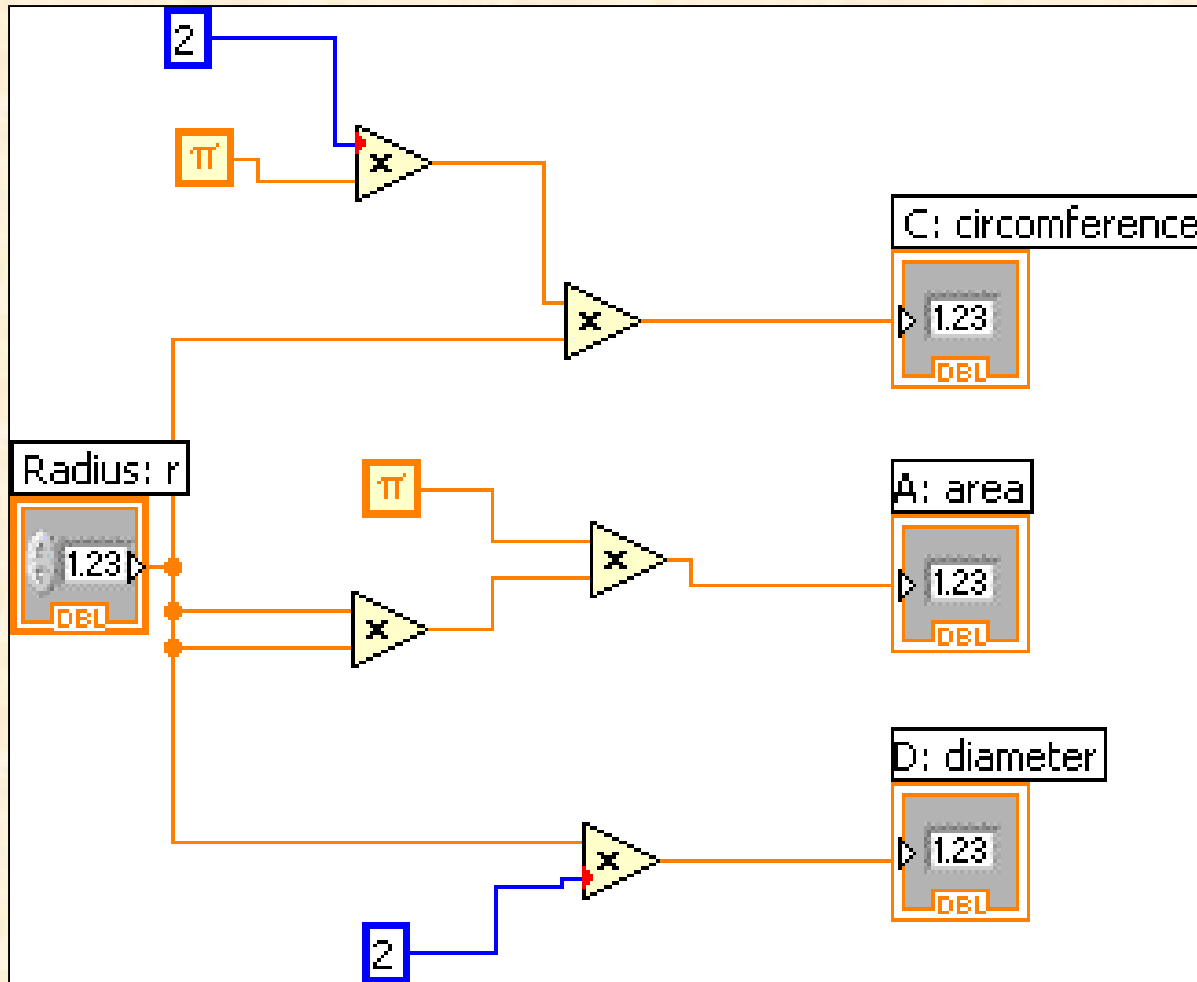
Circumference	$C = 2\pi r$
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Area	$A = \pi r^2$
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Diameter	$D = 2r$
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**Step 1.** Construct a VI to utilize the formulas given above to calculate  $C$ ,  $A$  and  $D$ . given  $r$ .

# Block Diagram



(Step 2. Editing the Icon)

**Step 3.** Create Terminals as Controls (SubVI input) and Indicators (SubVI output)

**Step 4.** Show the terminals: click the right icon in the Front Panel to each terminal that correspond to a control or a indicator.

**Step 5.** Creating Help Window for the SubVI:

- Adding description for each terminal: r, C, A, D;
- Adding description for the VI: File>>VI Properties>>documentation.

**Step 6.** Save the file name as “Circle measurement.vi”. Now, the VI file can be used as an SubVI.

**Step 7.** Open a new VI, assign the connector terminals with proper control (as input) and indicators (as outputs). Using wire tool to connect them.

Run this VI program.

## 1.4. The General Procedures to Create a SubVI

1.4.1 Edit the Icon

1.4.2 Edit the Terminal Pattern

1.4.3 Assign Terminals to Controls and Indicators

1.4.4 Add Description

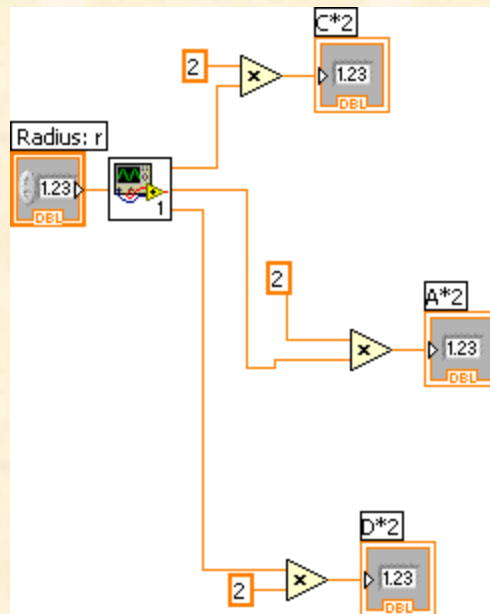
1.4.5 Save the SubVI

1.4.6 Write a New VI and call the SubVI (Function>Select a VI)

## Assignment 1

a) Write the above SubVI with  $r$  as input, and  $C$ ,  $A$  and  $D$  as output. Save this file.

b) Write a VI that call the SubVI, in which a control send the input data  $r$  to the SubVI. The outputs  $C$ ,  $A$  and  $D$  of the SubVI will multiply by 2, and shows the results with 3 indicators, respectively.



## Assignment 2

- Construct a SubVI that computes the average of three-number input.
- Write a VI using the SubVI to calculate the average three input numbers from the front panel. Then, add a piece of code that multiply the computed average by a random number in the range  $[0, \dots, 1]$ . Display both (a) the average, (b) the random number, and (c) the multiplication of the random number and the average, respectively.

### Assignment 3

Construct a VI that solves the quadratic formula to find the real roots of the equation:

$$ax^2 + bx + c = 0$$

Where x is the variable. a, b and c are constant. The real solution of the equation is given by

$$x_1 = (-b + \sqrt{b^2 - 4ac}) / (2a) \text{ and } x_2 = (-b - \sqrt{b^2 - 4ac}) / (2a)$$

Construct a VI to computer the above roots. There are should 2 outputs for the 2 roots, and 3 inputs for the constant a, b and c. Once you finish the code, using this VI to create a SubVI.

Call your subVI in a new VI.