INVERTING SUMMER USING OP-AMP

by

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THEORY/DESCRIPTION:

The Inverting summer also known as the adder is an Op-Amp based circuit where multiple input signals of different voltages are added. This is an extended version/example of the Inverting amplifier but with multiple inputs. Here the input voltages are applied the inverting terminal of the. In this Inverting summer the output is sum of the individual inputs and is out of phase by 180° from the sum of the inputs.

DESIGN:

A general design of the Inverting summer is shown in the following circuit. Normal Inverting Amplifier circuit has only one voltage / input at its inverting input terminal. If more input voltages are connected to the inverting input terminal as shown, the resulting output will be the sum of all the input voltages applied, but inverted.
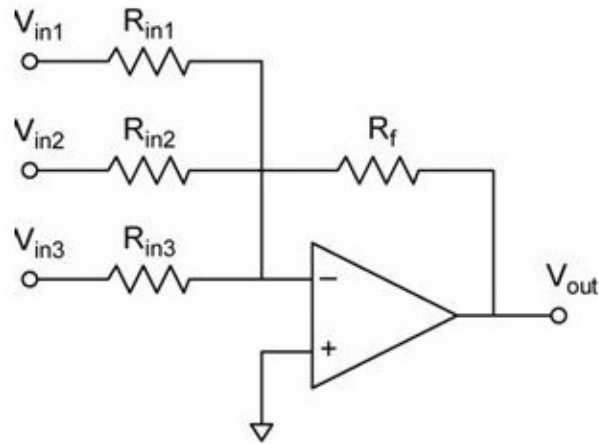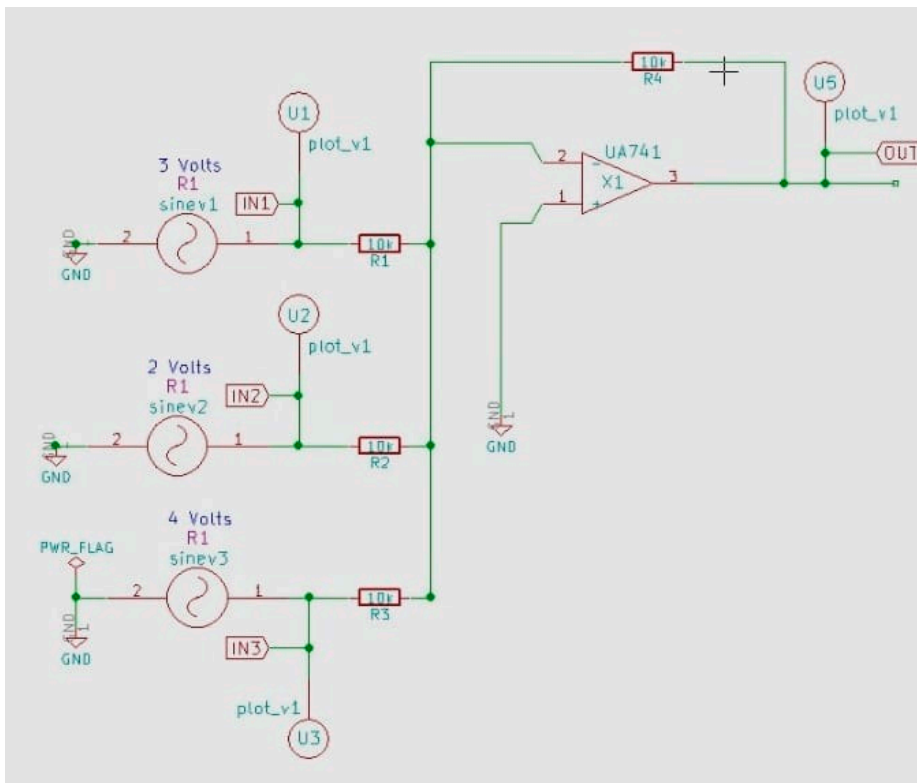
The Summing Amplifier Circuit Diagram

$V_{OUT} = V_1 A_{V1} + V_2 A_{V2} + \ldots + V_n A_{Vn}$

Where Vout is the sum of the individual input voltages and Av(Rf/Rin ratio) is the amplification factor which is 1 here. Here for the circuit to act as an summer and not a summing amplifier the Rin,Rin2,Rin3.... and Rf must be equal. So we will obtain just the sum of the individual inputs.

SCHEMATIC DIAGRAM:
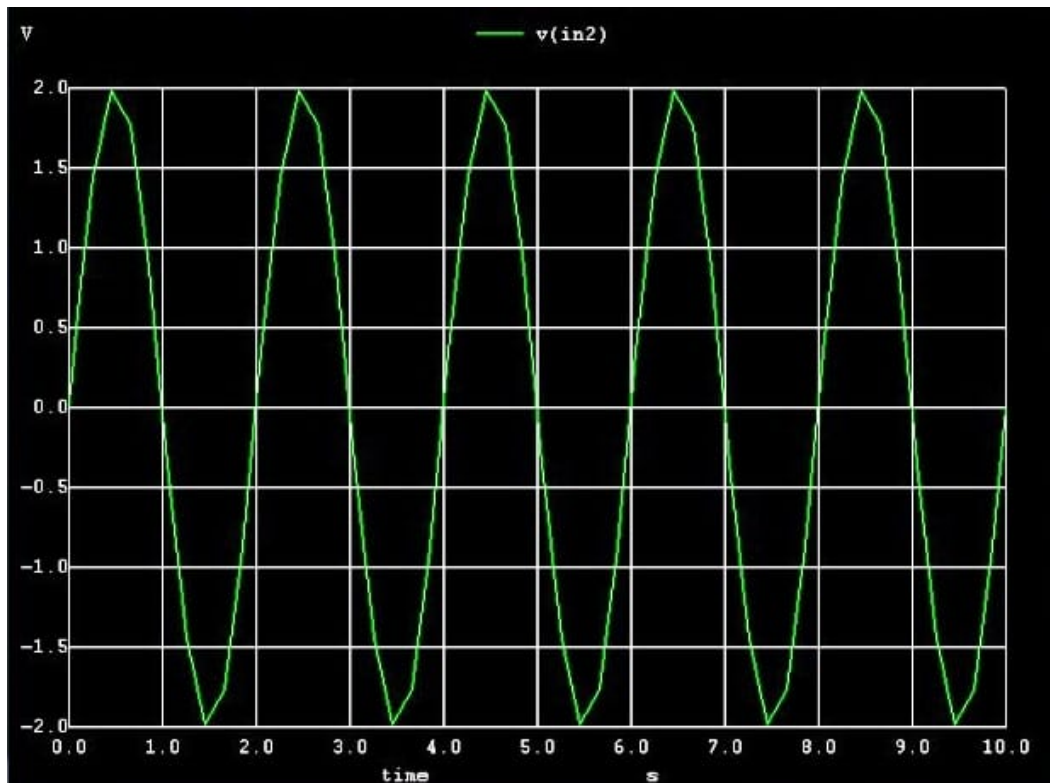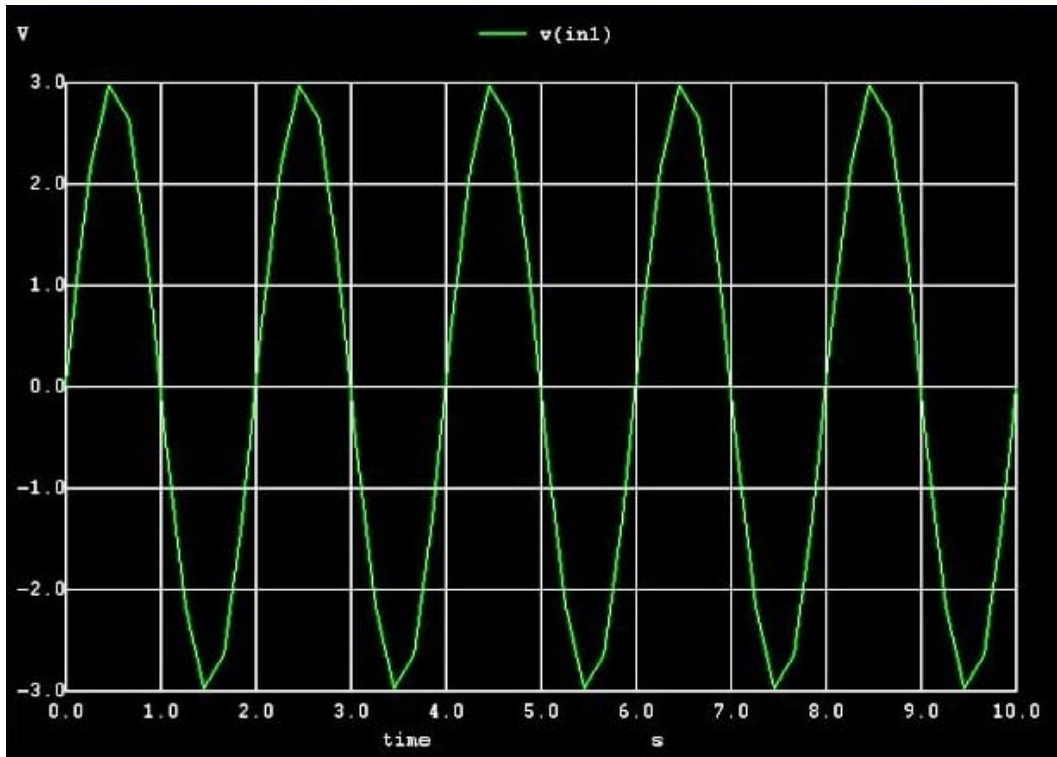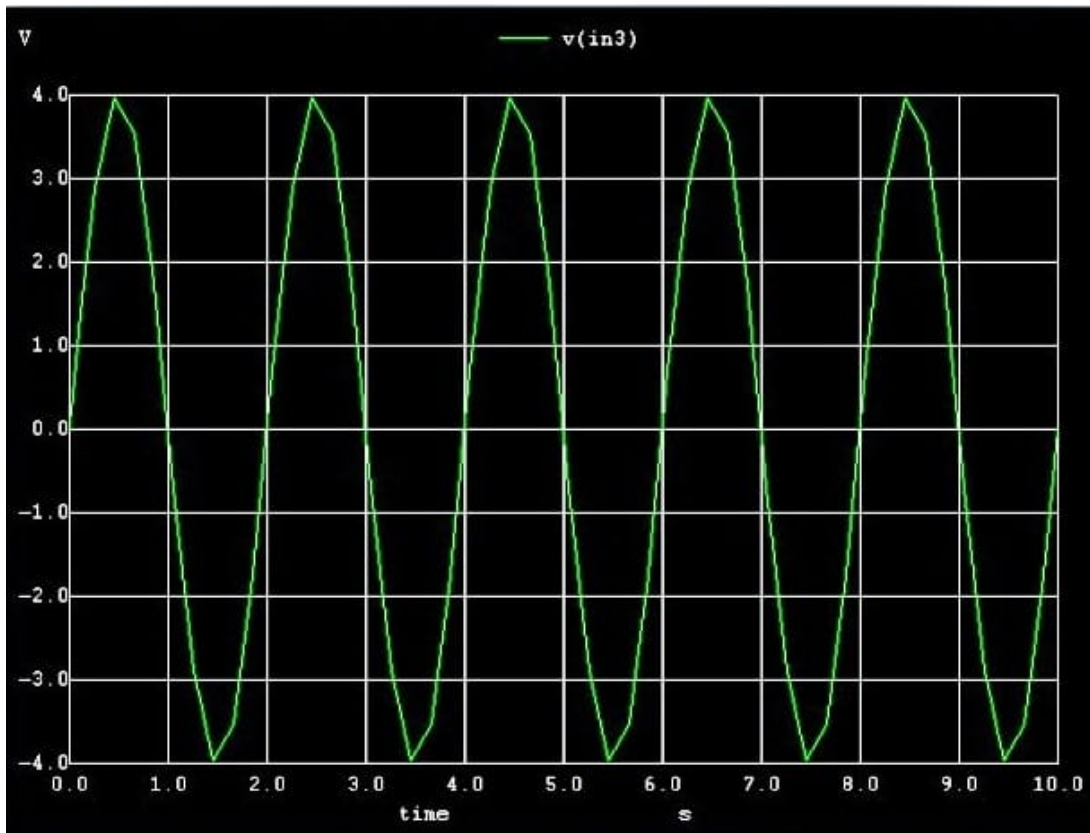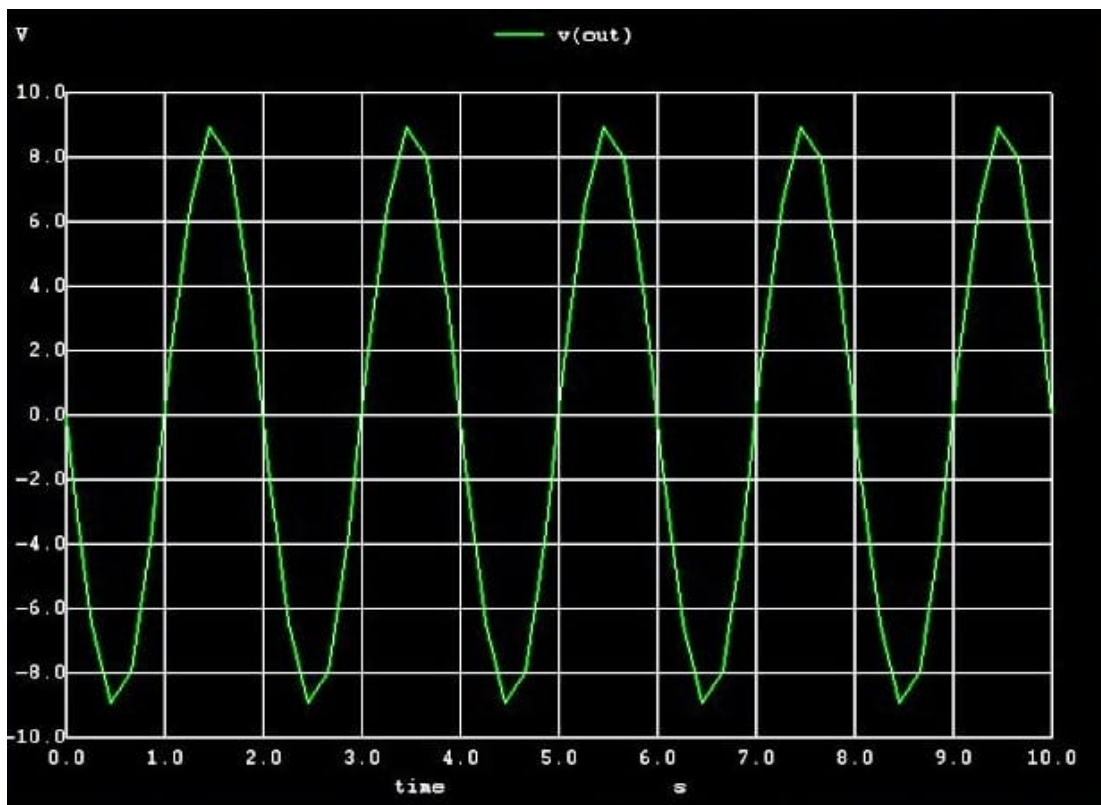
SIMULATION RESULTS:
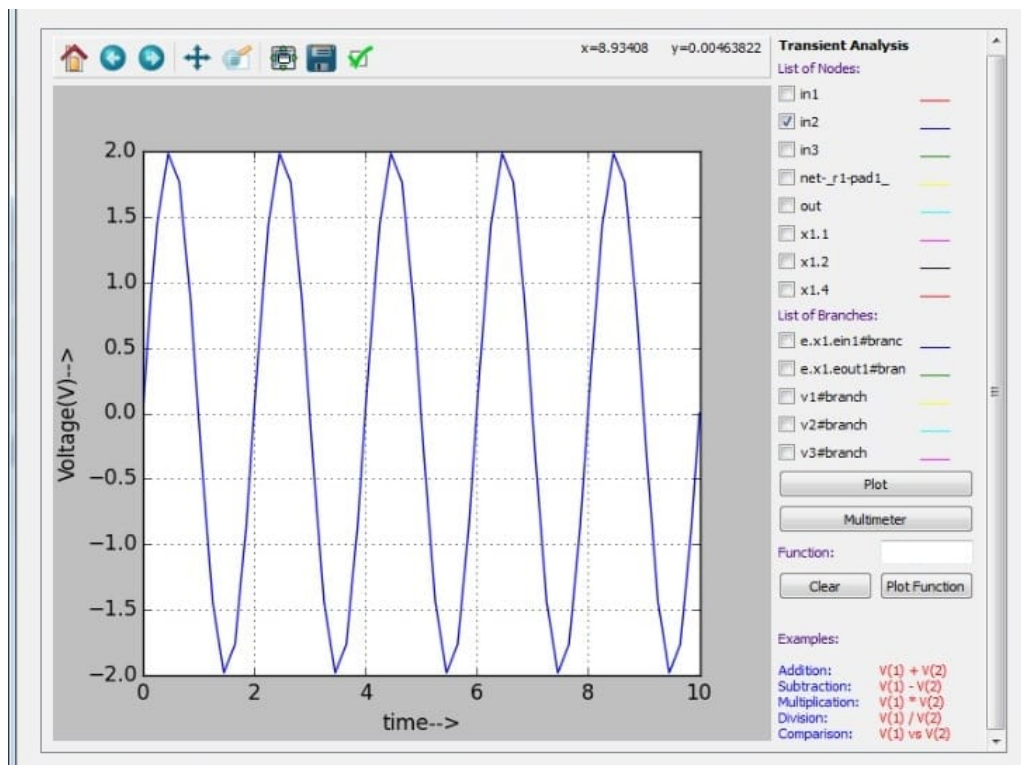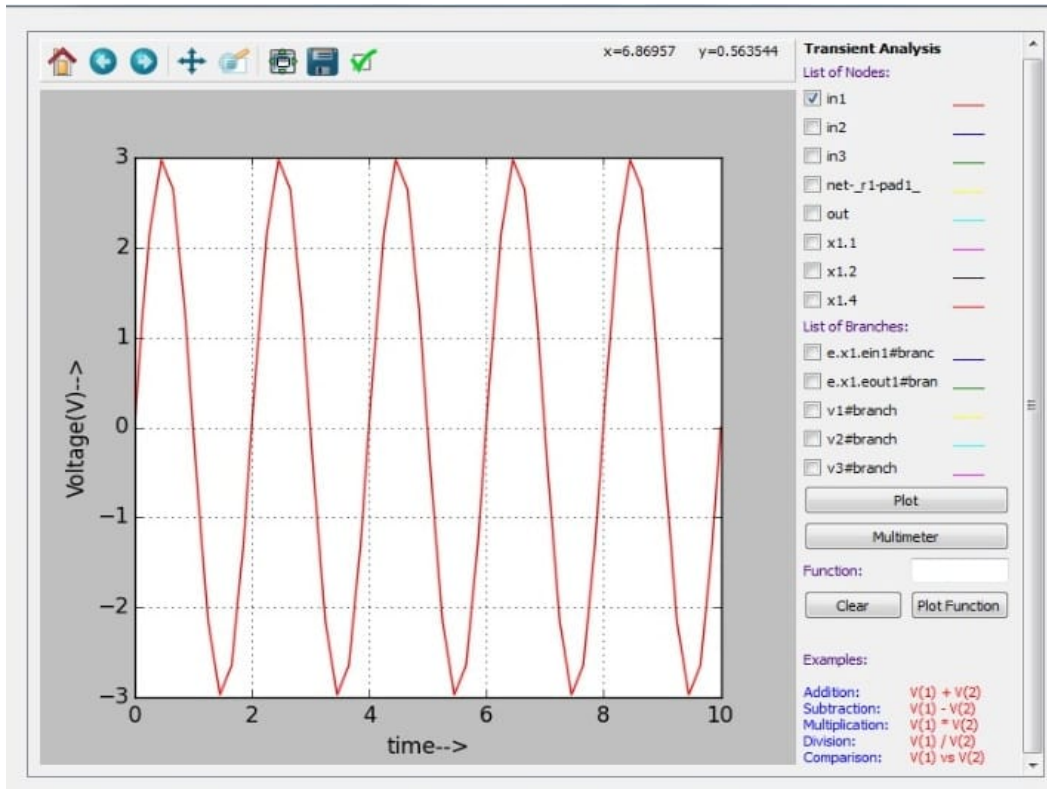
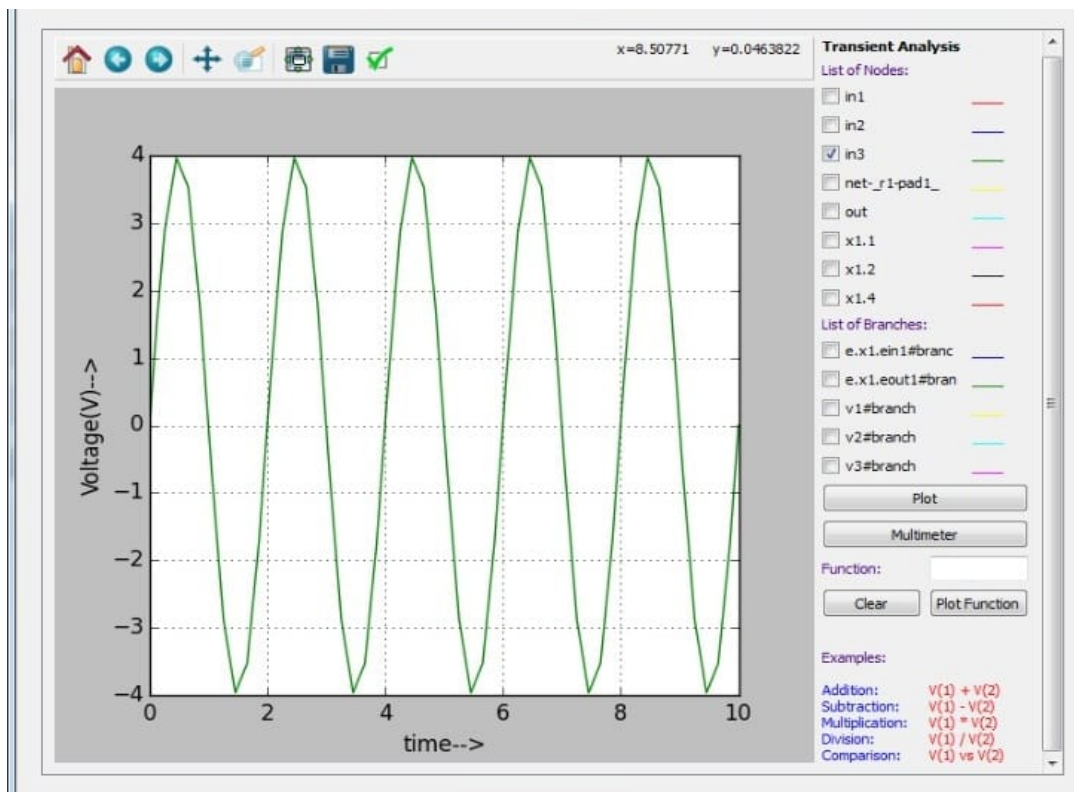## Ngspice Plots-

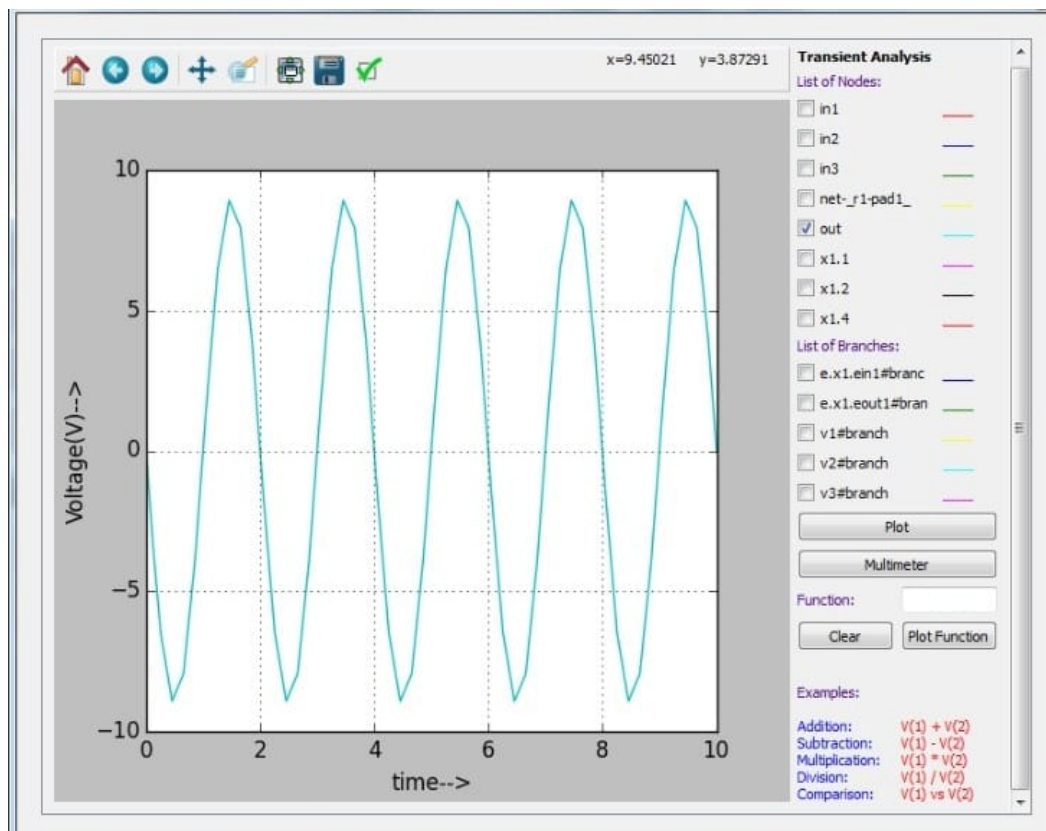### Input Voltages

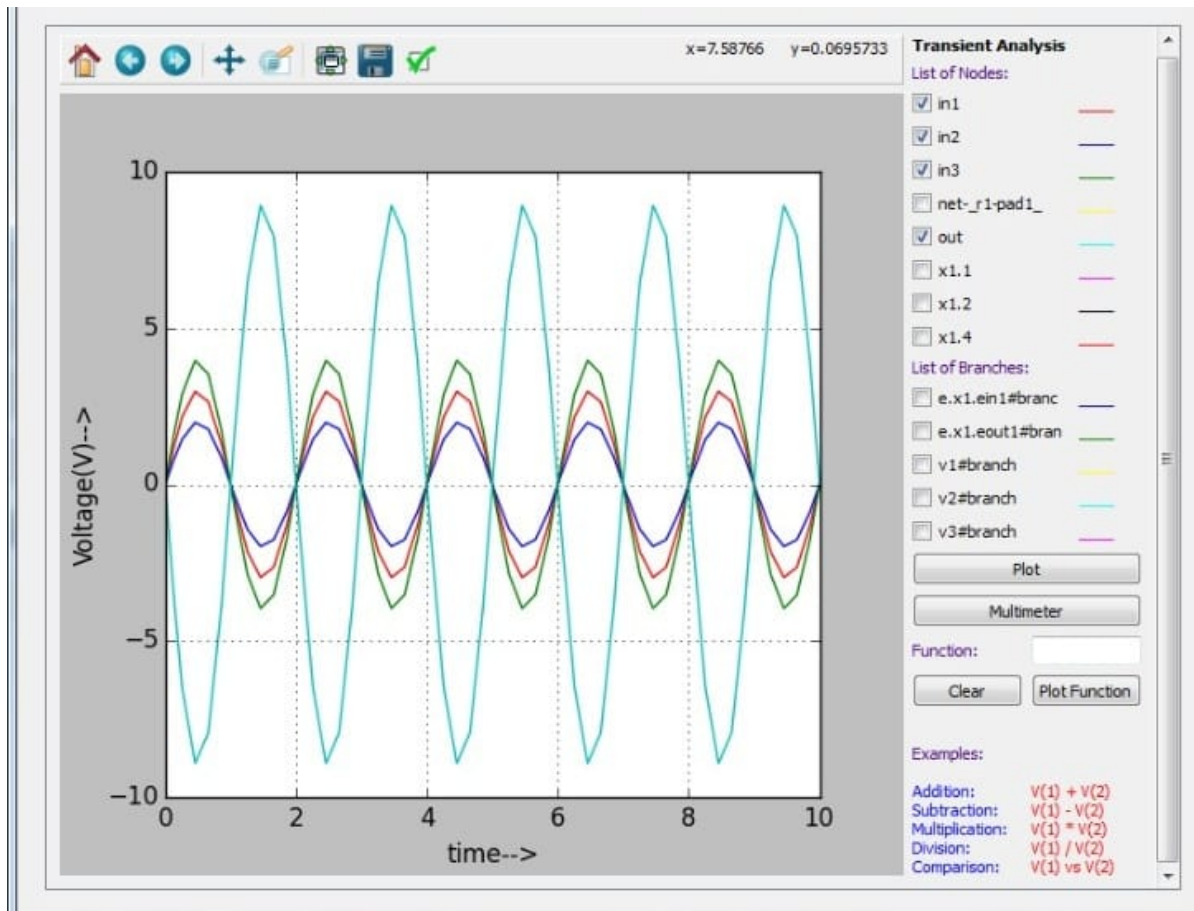**Output Voltage**

Python plots:

Input plots

Output plot

Input and Output voltage Plot

CONCLUSION:

Hence, we have designed a Inverting Summer and plotted the input and output waveforms using esim.

REFERENCES:

https://www.electronicshub.org/summing-amplifier/