BE LAB TASK # 12/13

Name: Shahmeer khan.

Class ID: 106293.

Student ID: 12113.

Topic: Non-Inverting Voltage Amplifier.

Objectives:

In this exercise, the performance of the non-inverting voltage amplifier will be examined. The investigation will include the effect of feedback resistors on setting voltage gain, stability of gain with differing op amps, and input impedance.

Task (According to Sir):

1) Calculations From Voltage 0.3 V:

- **Theoretical Av:**
- **Since Formula:**
- **Av = 1+Rf / Rin.**

Av = 1 + 2k / 1k = 3

Av = 1 + 4.7k / 1k = 5.7

Av = 1 + 10k / 1k = 11

Av = 1 + 22k / 1k = 23

Av = 1 + 33k / 1k = 34

Av = 1 + 47k / 1k = 48

- **Experimental Av:**
- **Since Formula:**
- **Av = Vout / Vin**

Av = 0.8999973 V / 0.3 V = 2.999991

Av = 1.71 V / 0.3 V = 5.7

Av = 3.3 V / 0.3 V = 11

Av = 6.898 V / 0.3 V = 22.99

Av = 10.197 V / 0.3 V = 33.99

Av = 14.393V / 0.3 V = 47.97

- **Deviation:**

AV (Theoretical) – AV (Experimental) x 100 / Av (Theoretical)

3 - 2999991 x 100 / 3 = 0.003

5.7 – 5.7 x 100 / 5.7 = 0

11 – 11 x 100 / 11 = 0

23 – 22.99 x 100 / 23 = 0.04

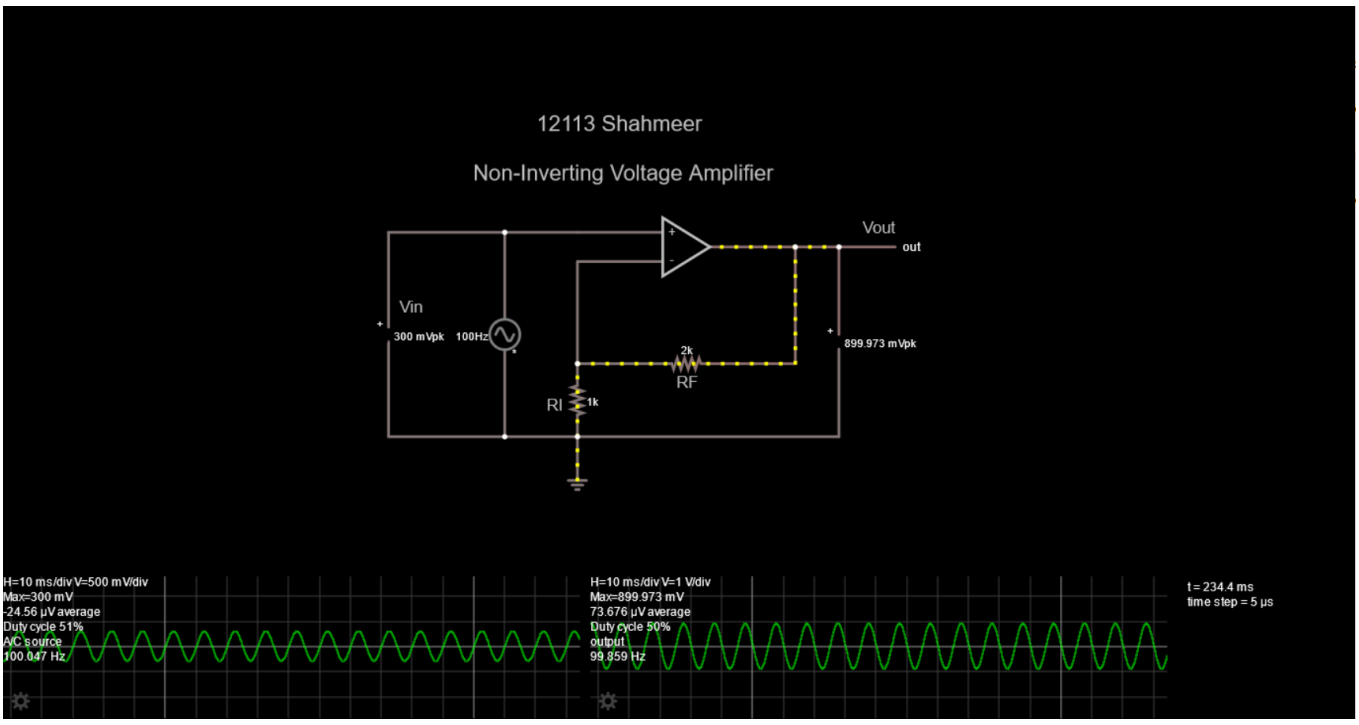
34 – 33.99 x 100 / 34 = 0.02

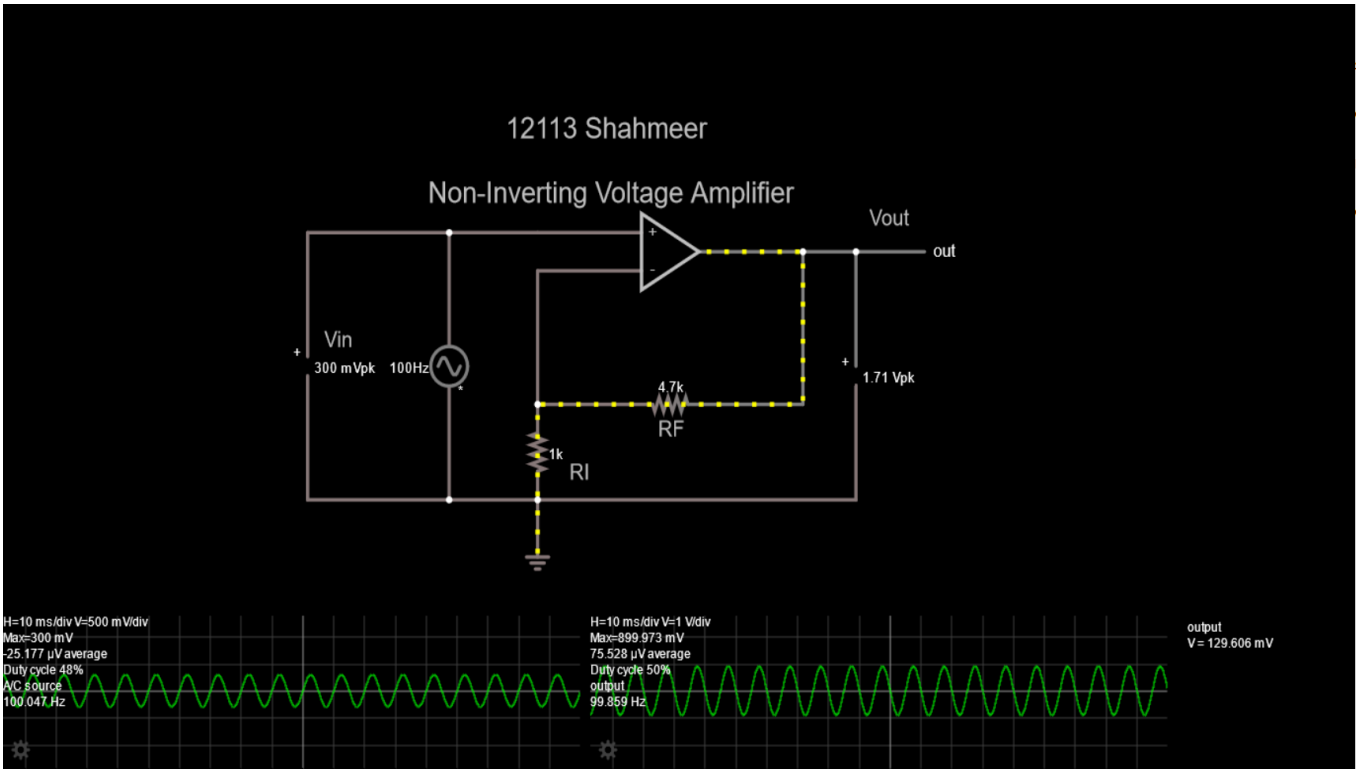
48 – 47.97 x 100 / 48 = 0.06

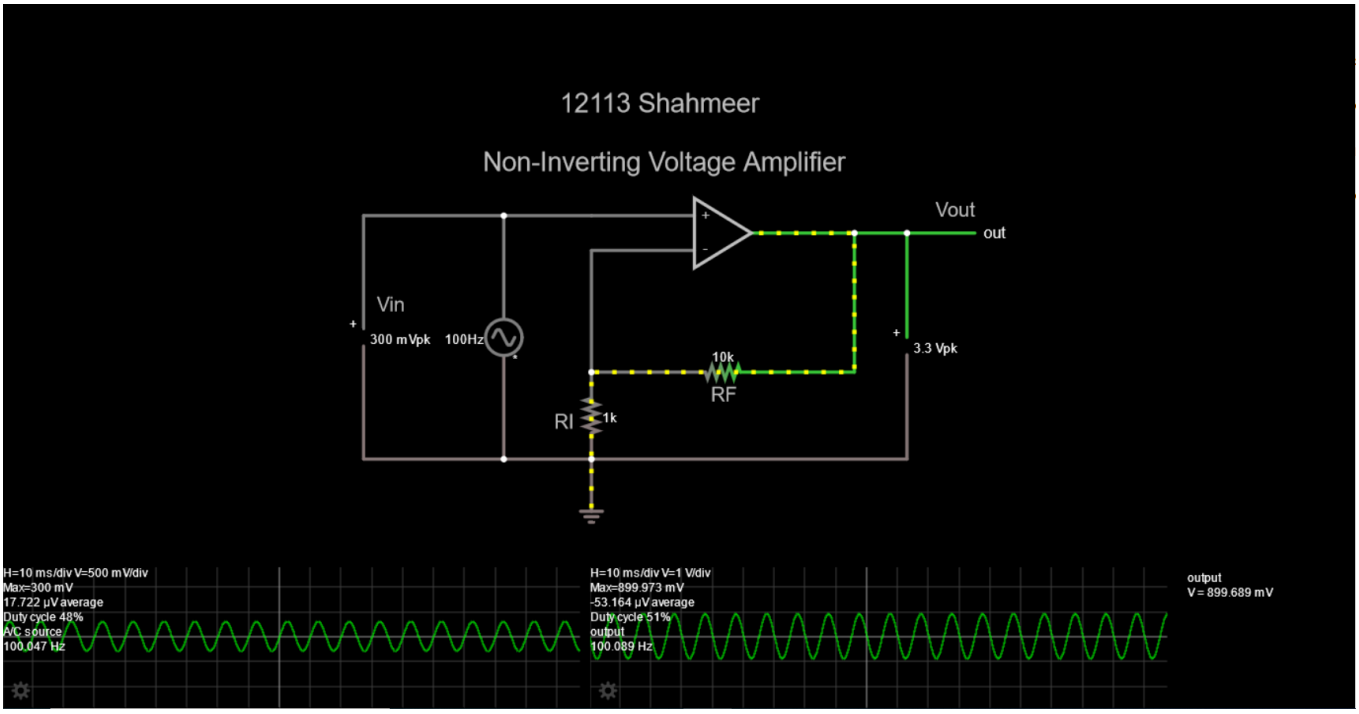
RF	THEORETICAL AV	V OUT	EXPERIMENTAL AV	% DEVIATION
2 k	3	899.973 m Vpk	2.99	0.33

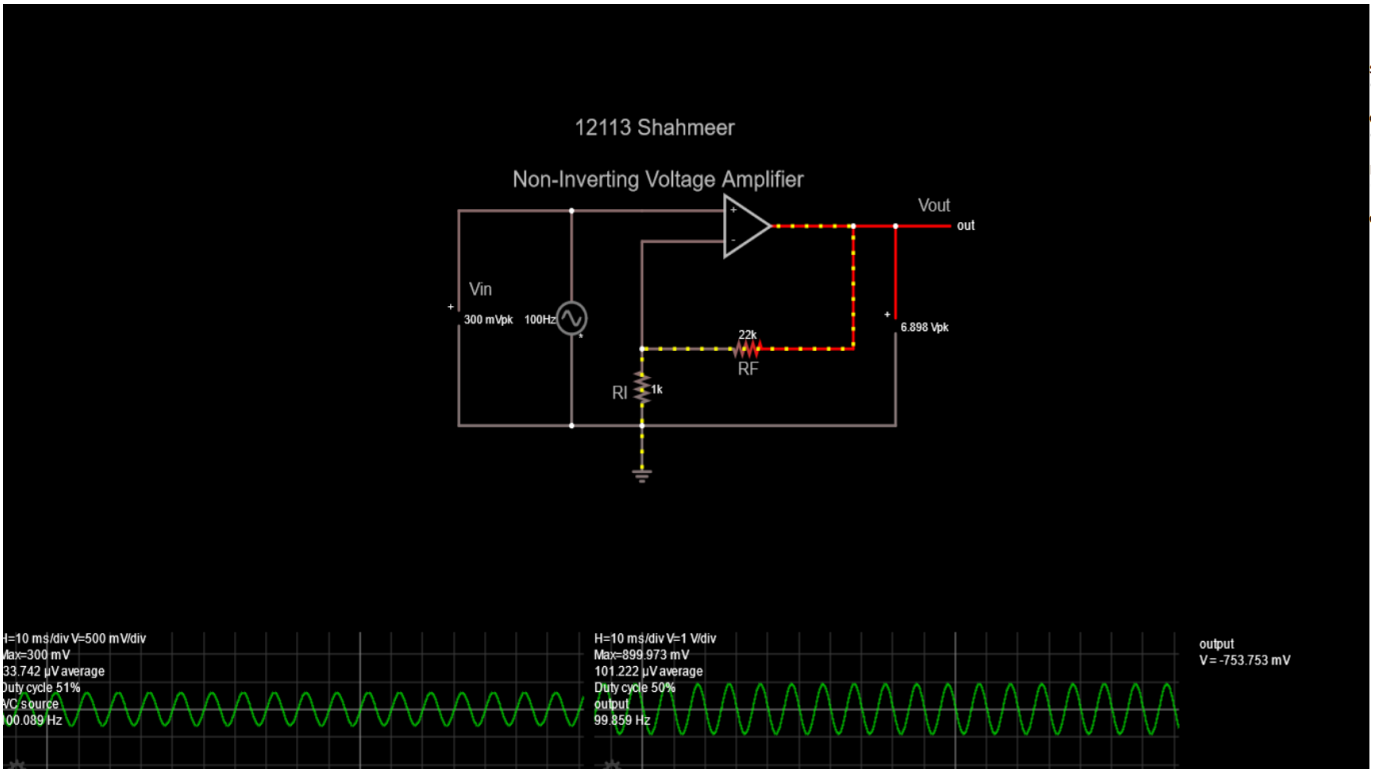
4.7k	5.7	1.71 Vpk	5.7	0
10k	11	3.3 Vpk	11	0
22K	23	6.898 Vpk	22.99	0.04
33k	34	10.197 Vpk	33.99	0.02
47k	48	14.393 Vpk	47.97	0.06

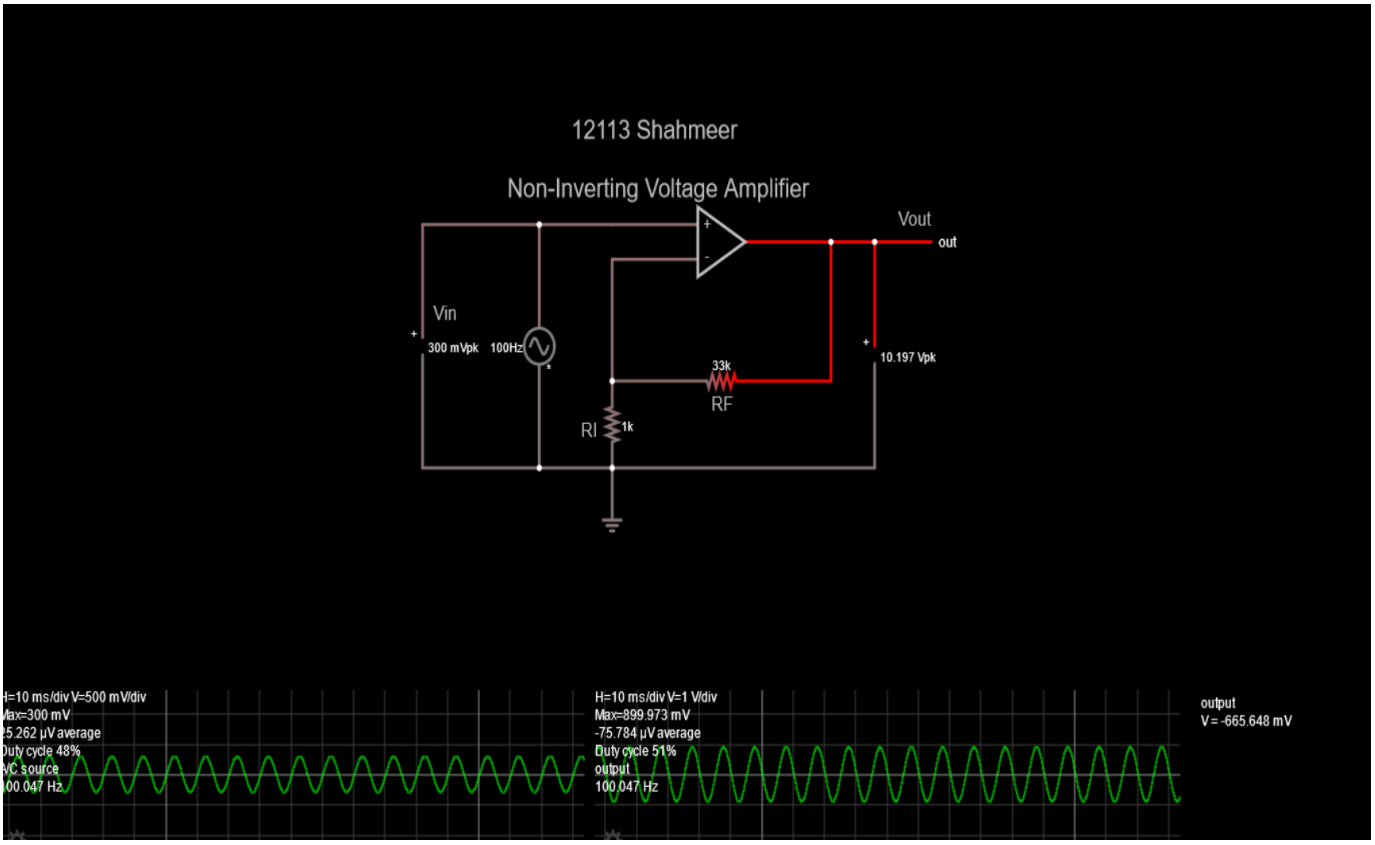
Screen-shots:

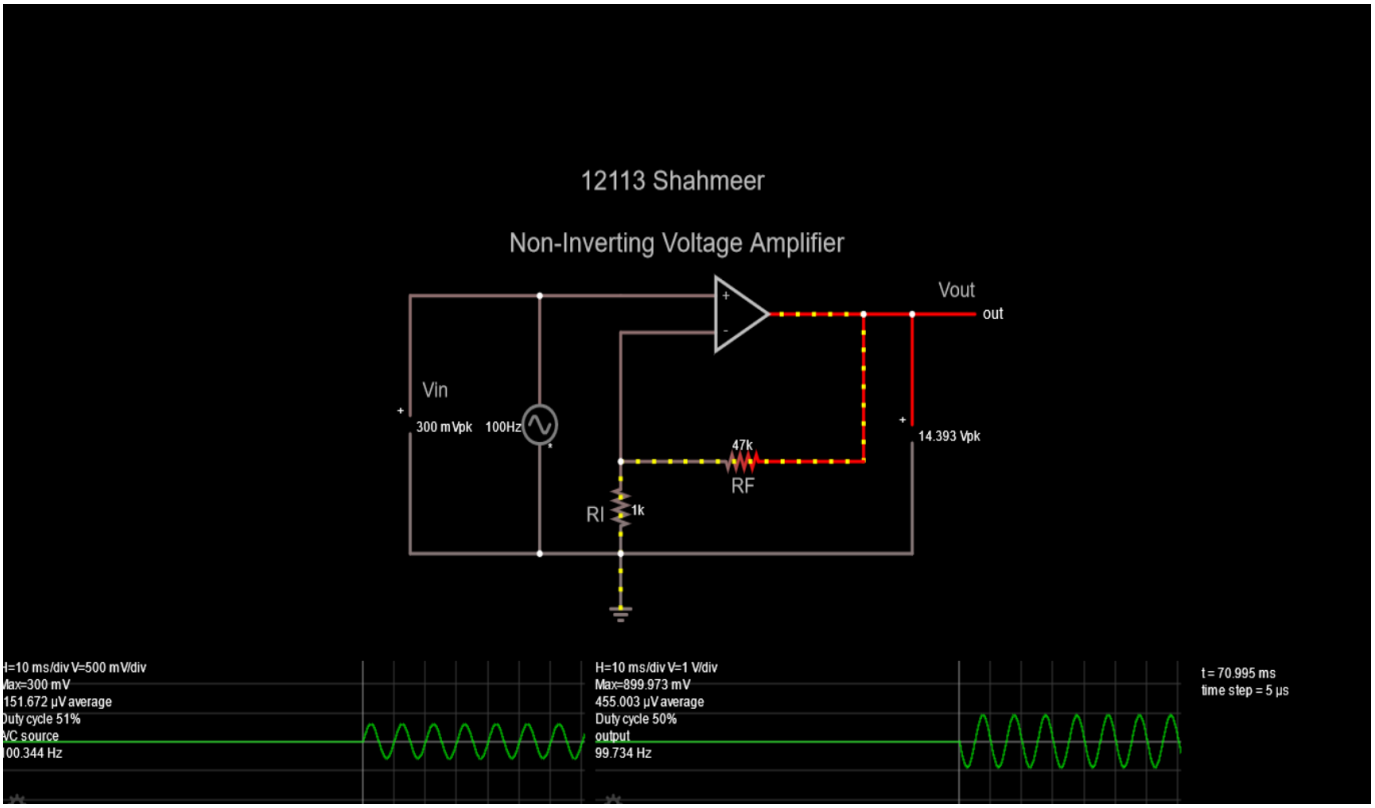



12113 Shahmeer
Non-Inverting Voltage Amplifier
Vout
out
Vin
300 mVpk 100Hz
4.7k
RF
1k
RI
1.71 Vpk
H=10 ms/div V=500 mV/div
Max=300 mV
-25.177 µV average
Duty cycle 48%
A/C source
100.047 Hz
H=10 ms/div V=1 V/div
Max=899.973 mV
75.528 µV average
Duty cycle 50%
output
99.859 Hz
output
V = 129.606 mV


12113 Shahmeer
Non-Inverting Voltage Amplifier
Vout
out
Vin
300 mVpk 100Hz
10k
RF
RI
1k
3.3 Vpk
H=10 ms/div V=500 mV/div
Max=300 mV
17.722 µV average
Duty cycle 48%
A/C source
100.047 Hz
H=10 ms/div V=1 V/div
Max=899.973 mV
-53.164 µV average
Duty cycle 51%
output
100.089 Hz
output
V = 899.689 mV


12113 Shahmeer
Non-Inverting Voltage Amplifier
Vout
out
Vin
300 mVpk 100Hz
22k
RF
RI
1k
6.898 Vpk
H=10 ms/div V=500 mV/div
Max=300 mV
33.742 µV average
Duty cycle 51%
VC source
00.089 Hz
H=10 ms/div V=1 V/div
Max=899.973 mV
101.222 µV average
Duty cycle 50%
output
99.859 Hz
output
V = -753.753 mV


12113 Shahmeer
Non-Inverting Voltage Amplifier
Vout
out
Vin
300 mVpk 100Hz
33k
RF
RI
1k
10.197 Vpk
H=10 ms/div V=500 mV/div
Max=300 mV
25.262 µV average
Duty cycle 48%
VC source
00.047 Hz
H=10 ms/div V=1 V/div
Max=899.973 mV
-75.784 µV average
Duty cycle 51%
output
100.047 Hz
output
V = -665.648 mV



Link:

https://tinyurl.com/yzg2ful6

2) Calculations From Voltage 5 V:

- **Theoretical Av:**
- **Since Formula:**
- **Av = 1+Rf / Rin.**

Av = 1 + 2k / 1k = 3

Av = 1 + 4.7k / 1k = 5.7

Av = 1 + 10k / 1k = 11

Av = 1 + 22k / 1k = 23

Av = 1 + 33k / 1k = 34

Av = 1 + 47k / 1k = 48

- # Experimental Av:
- **Since Formula:**
- **Av = Vout / Vin**

Av = 15V / 5V = 3

Av = 15.043 / 5V = 3.0086

Av = 15.011V/ 5V = 3.0022

Av = 15V / 5V = 3

Av = 15V/5V = 3

Av = 15.063/5V = 3.0126

- # Deviation:

AV (Theoretical) – AV (Experimental) x 100 / Av (Theoretical)

3 – 3 x100 / 3 = 0

5.7 – 3.0086 x 100/5.7 = 47.21

11 – 3.0022 x 100/11 = 72.70

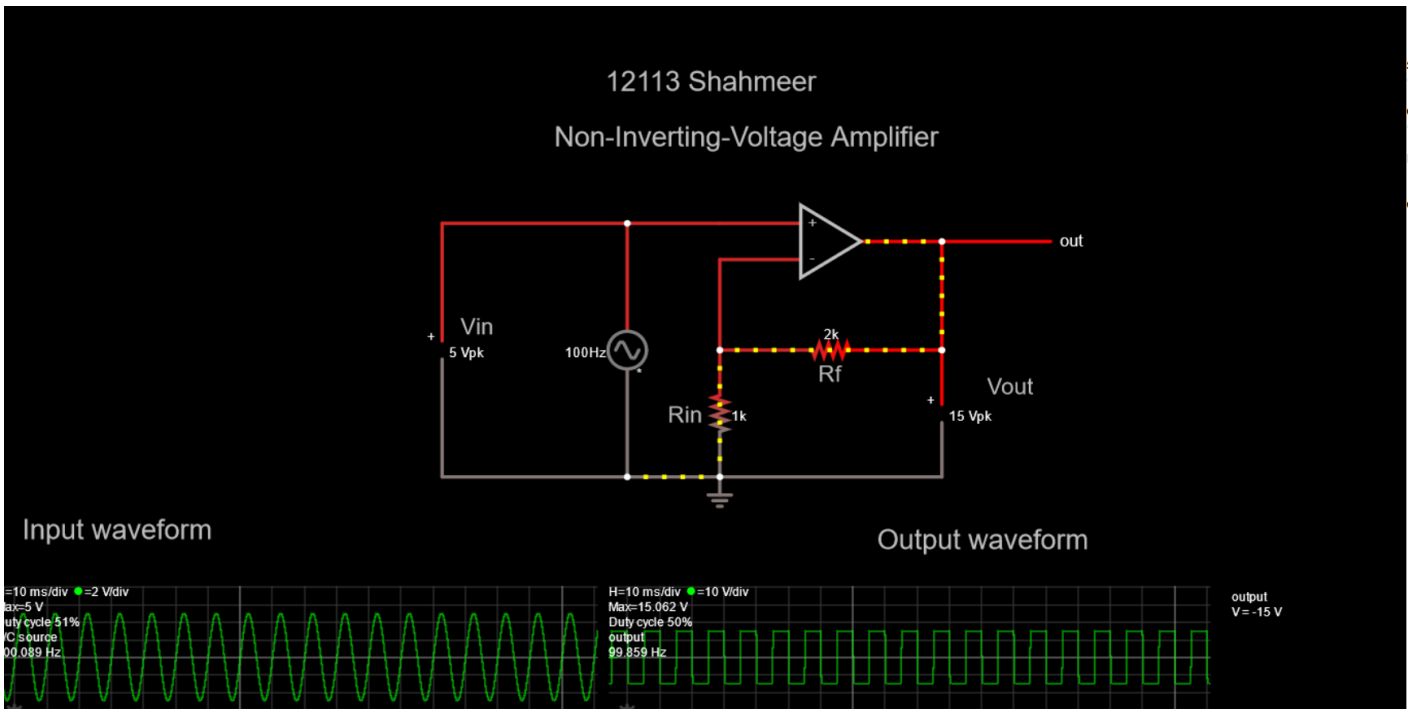
23 – 3 x100/23 = 86.95

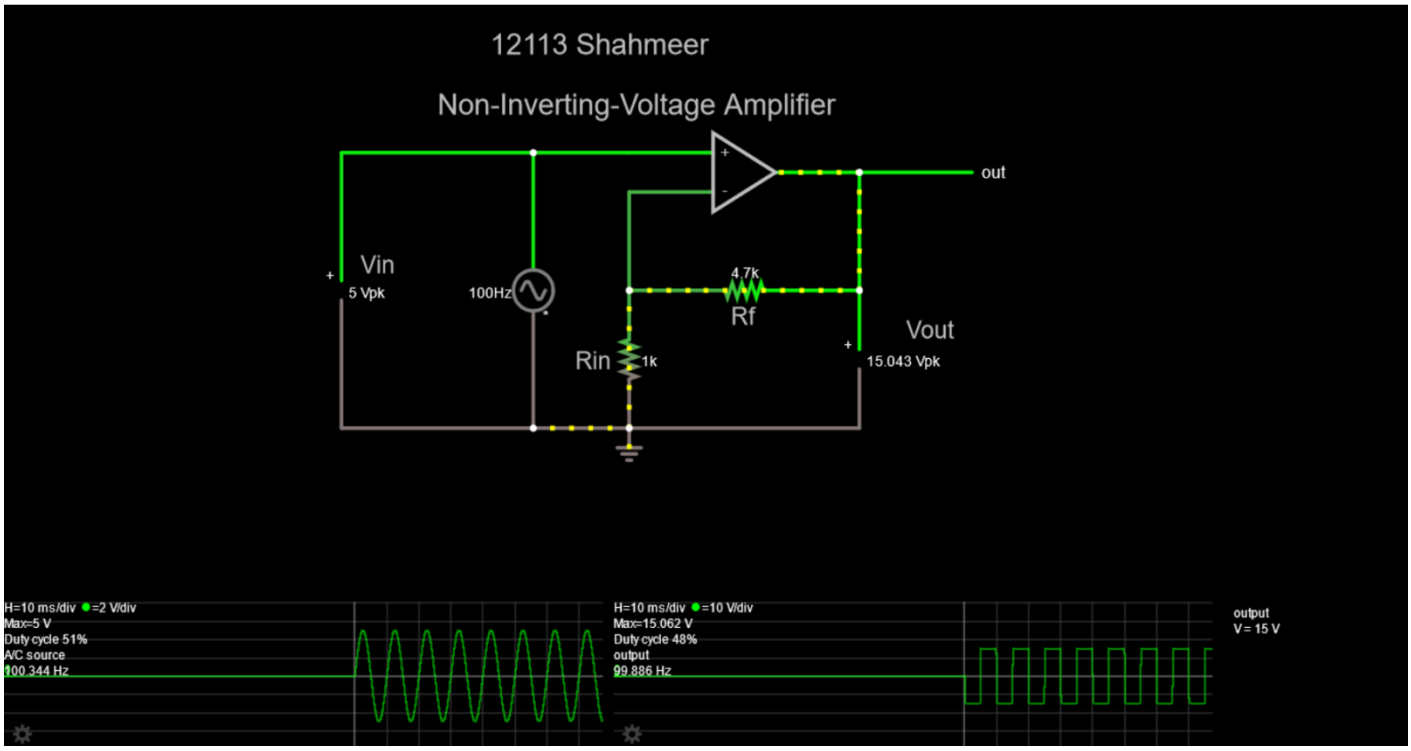
34 – 3 x100/34 =91.17

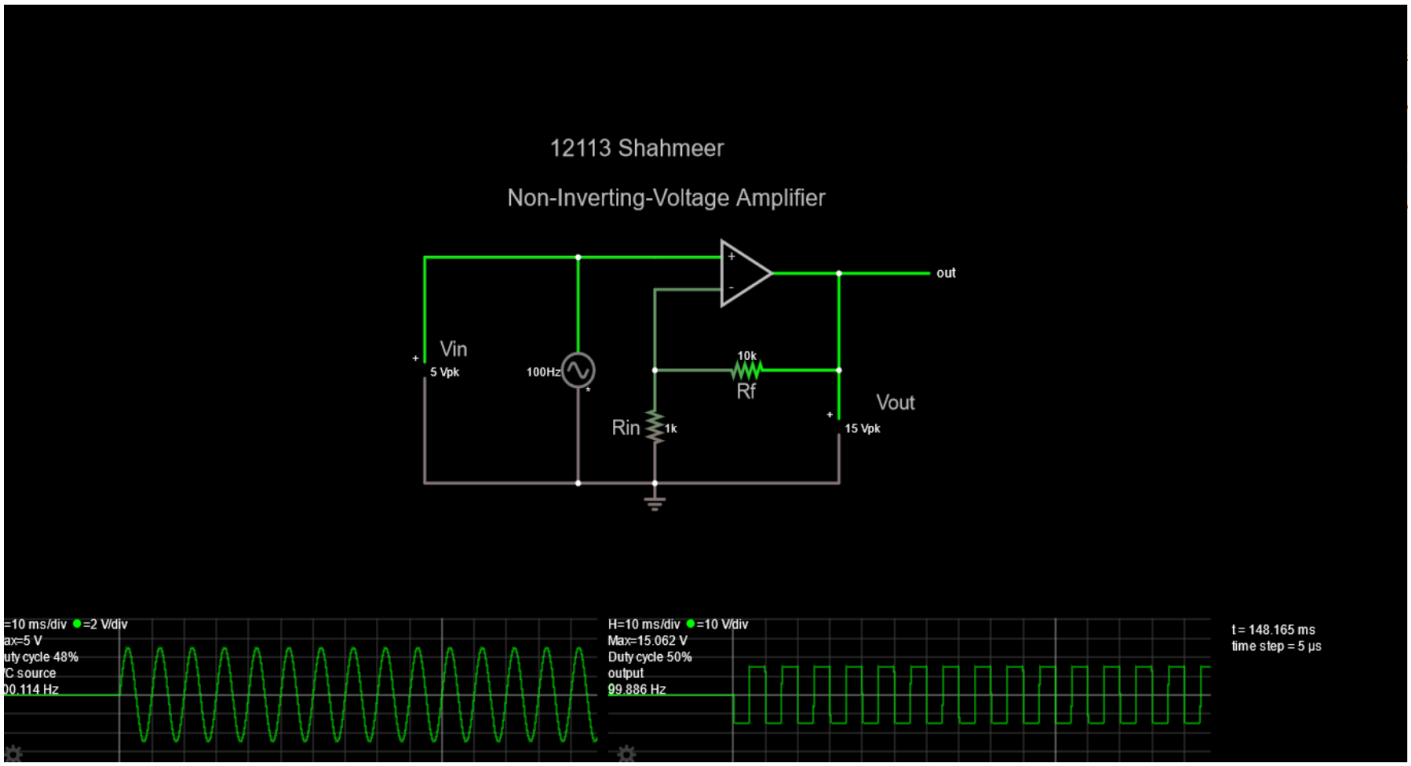
48 – 3.0126/48 = 93.72

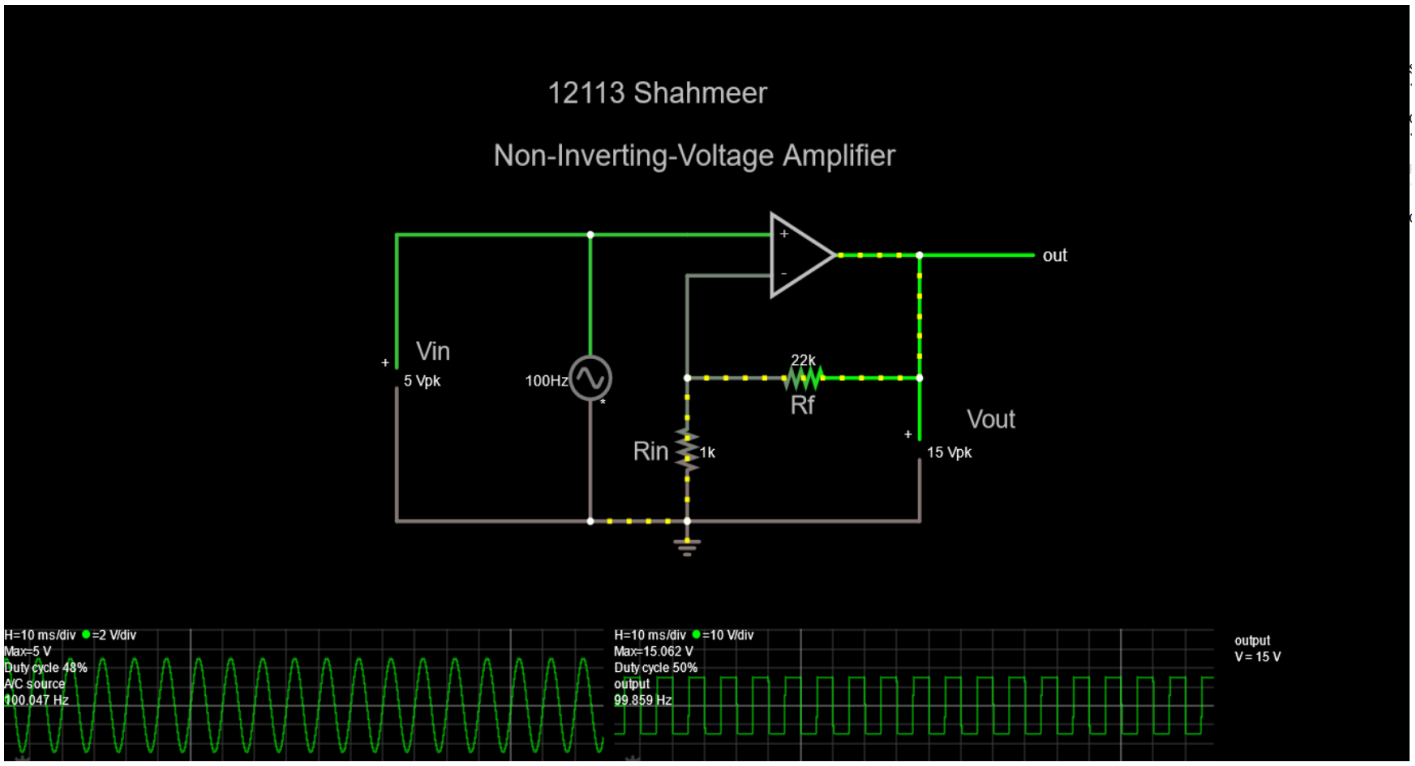
RF	Theoretical AV	V out	Experimental AV	Deviation %
2k	3	15 Vpk	3	0
4.7k	5.7	15.043 Vpk	3.0086	47.21
10k	11	15.011 Vpk	3.002	72.70
22k	23	15 Vpk	3	86.95
33k	34	15 Vpk	3	91.17
47k	48	15.062 Vpk	3.012	93.72

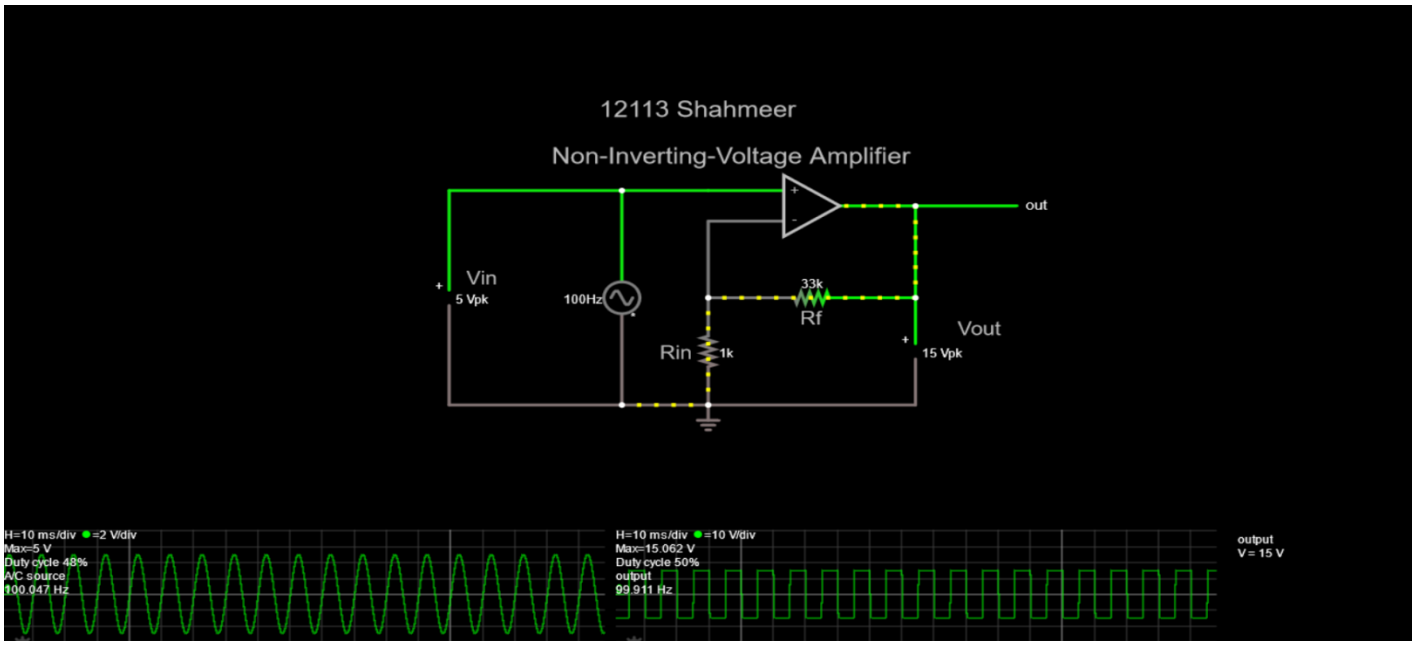
Screen-shots:

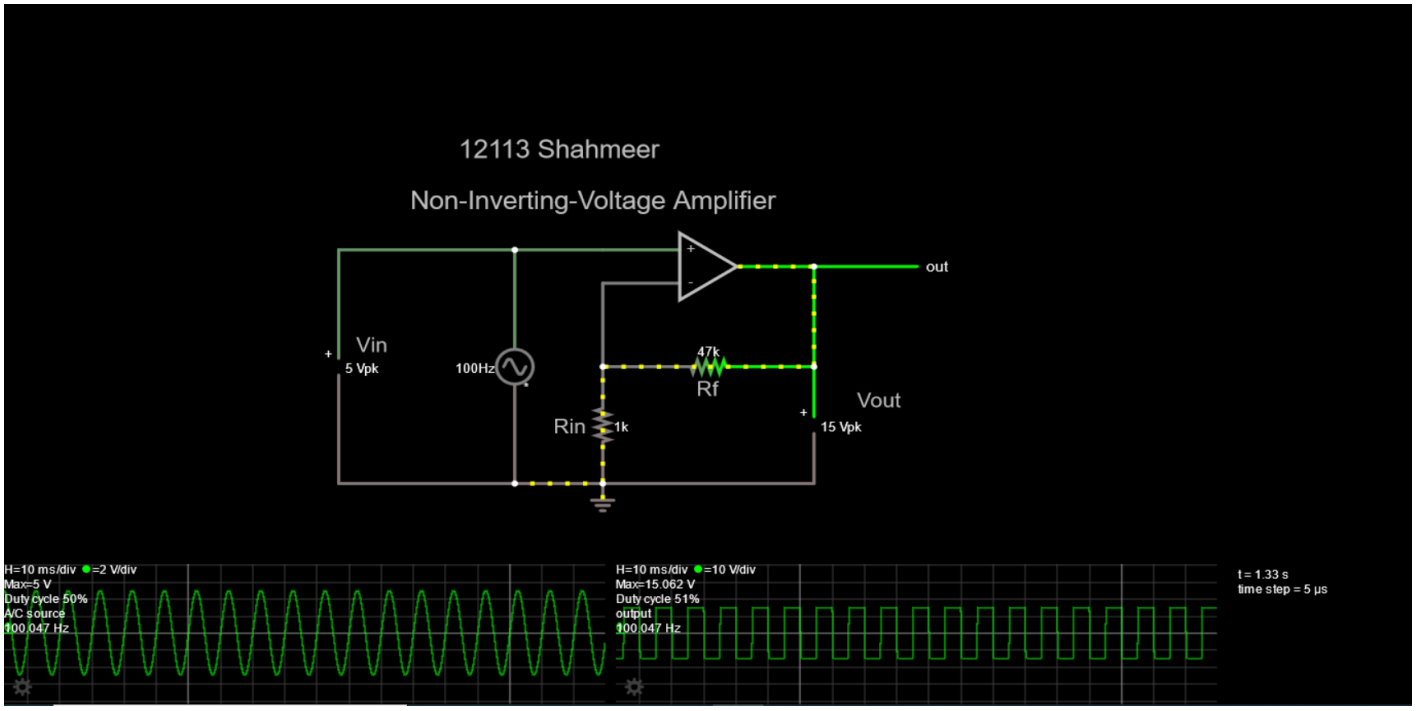



12113 Shahmeer
Non-Inverting-Voltage Amplifier
out
Vin
5 Vpk
100Hz
4.7k
Rf
Rin
1k
Vout
15.043 Vpk
H=10 ms/div
=2 V/div
Max=5 V
Duty cycle 51%
A/C source
100.344 Hz
H=10 ms/div
=10 V/div
Max=15.062 V
Duty cycle 48%
output
99.886 Hz
output
V= 15 V


12113 Shahmeer
Non-Inverting-Voltage Amplifier
out
Vin
5 Vpk
100Hz
10k
Rf
Rin
1k
Vout
15 Vpk
=10 ms/div
=2 V/div
ax=5 V
uty cycle 48%
C source
00.114 Hz
H=10 ms/div
=10 V/div
Max=15.062 V
Duty cycle 50%
output
99.886 Hz
t = 148.165 ms
time step = 5 µs


12113 Shahmeer
Non-Inverting-Voltage Amplifier
out
Vin
5 Vpk
100Hz
22k
Rf
Rin
1k
Vout
15 Vpk
H=10 ms/div =2 V/div
Max=5 V
Duty cycle 48%
A/C source
100.047 Hz
H=10 ms/div =10 V/div
Max=15.062 V
Duty cycle 50%
output
99.859 Hz
output
V = 15 V


12113 Shahmeer
Non-Inverting-Voltage Amplifier
out
Vin
5 Vpk
100Hz
33k
Rf
Rin
1k
Vout
15 Vpk
H=10 ms/div =2 V/div
Max=5 V
Duty cycle 48%
A/C source
100.047 Hz
H=10 ms/div =10 V/div
Max=15.062 V
Duty cycle 50%
output
99.911 Hz
output
V = 15 V



Link:

https://tinyurl.com/ydlgqgsk