Faculty of Engineering and Technology
Department of Electrical and Computer Engineering

ENEE 2103

CIRCUITS AND ELECTRONICS LABORATORY

Experiment #10, Pre-Lab #6

"Multistage Amplifiers and Frequency Response"

Prepared by:
Nour Naji-1190270

Section: 1

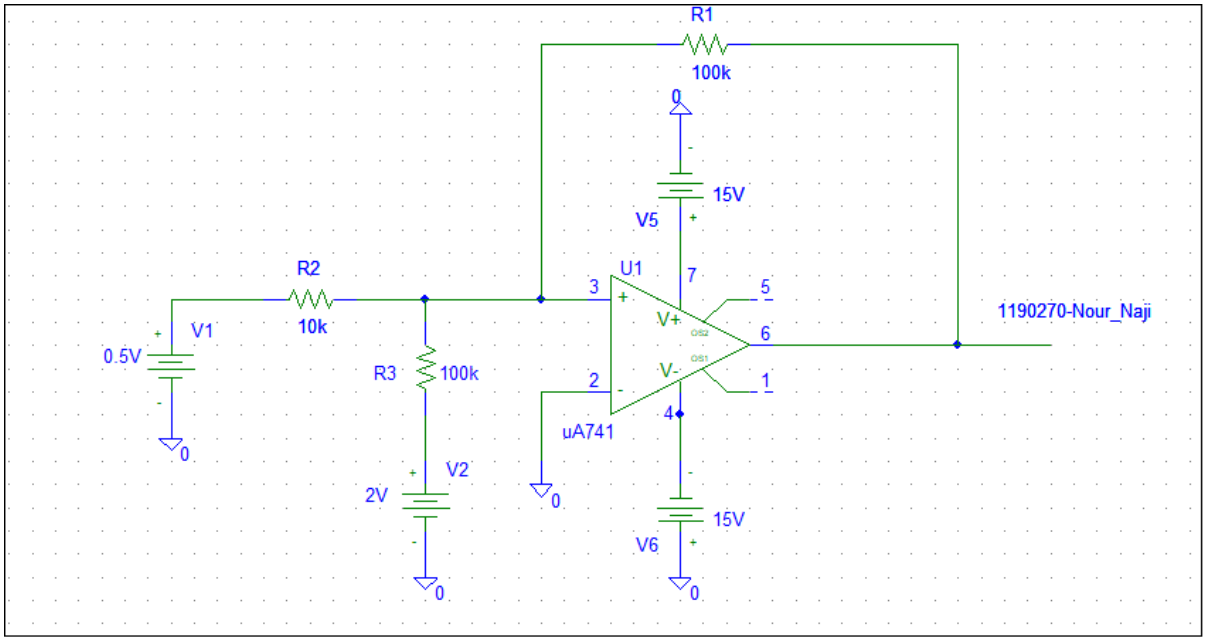
Supervised by:
Dr. Alhareth Zyoud

Teaching assistant:
Eng. Esmail Abualia

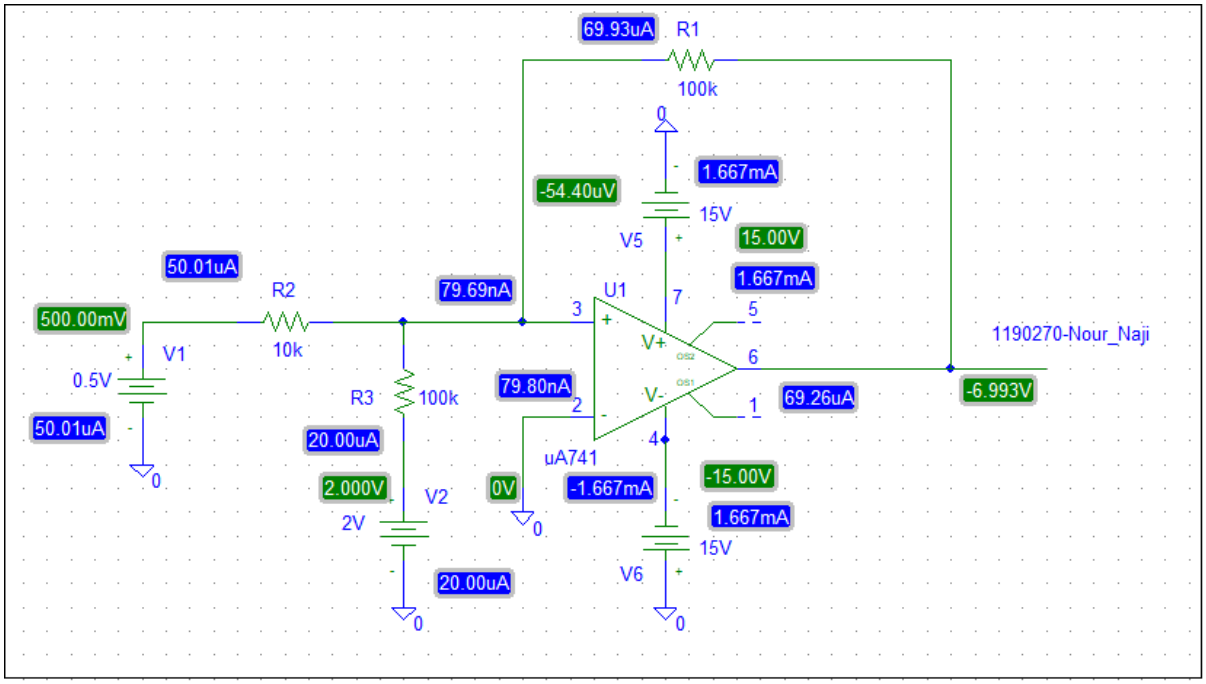
Date: 1/11/202

Table of Contents

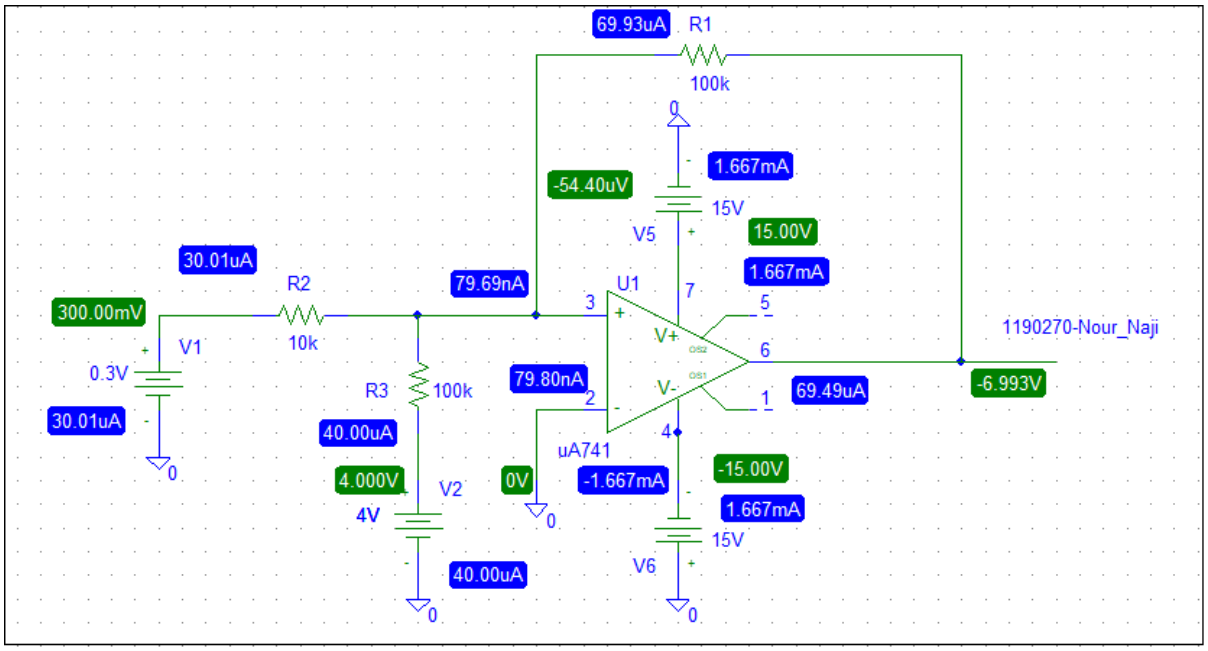
1. Adding Application:



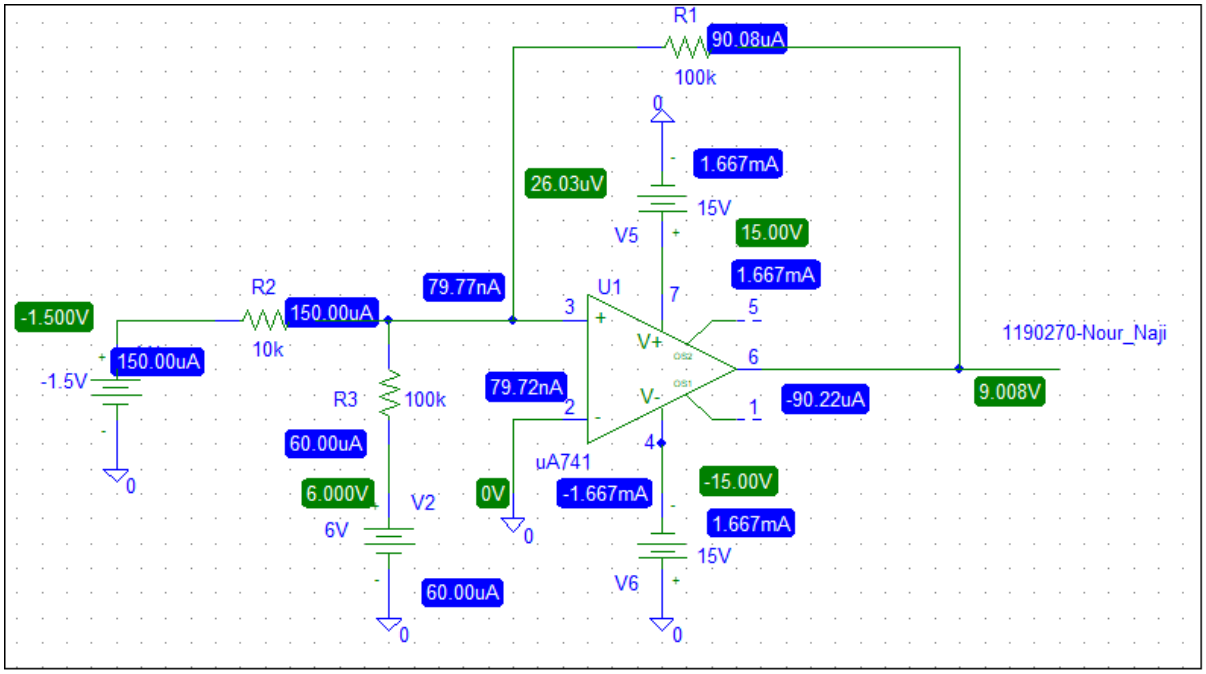
- If V_1 = 0.5v and V_2 = 2v, then V_0=:



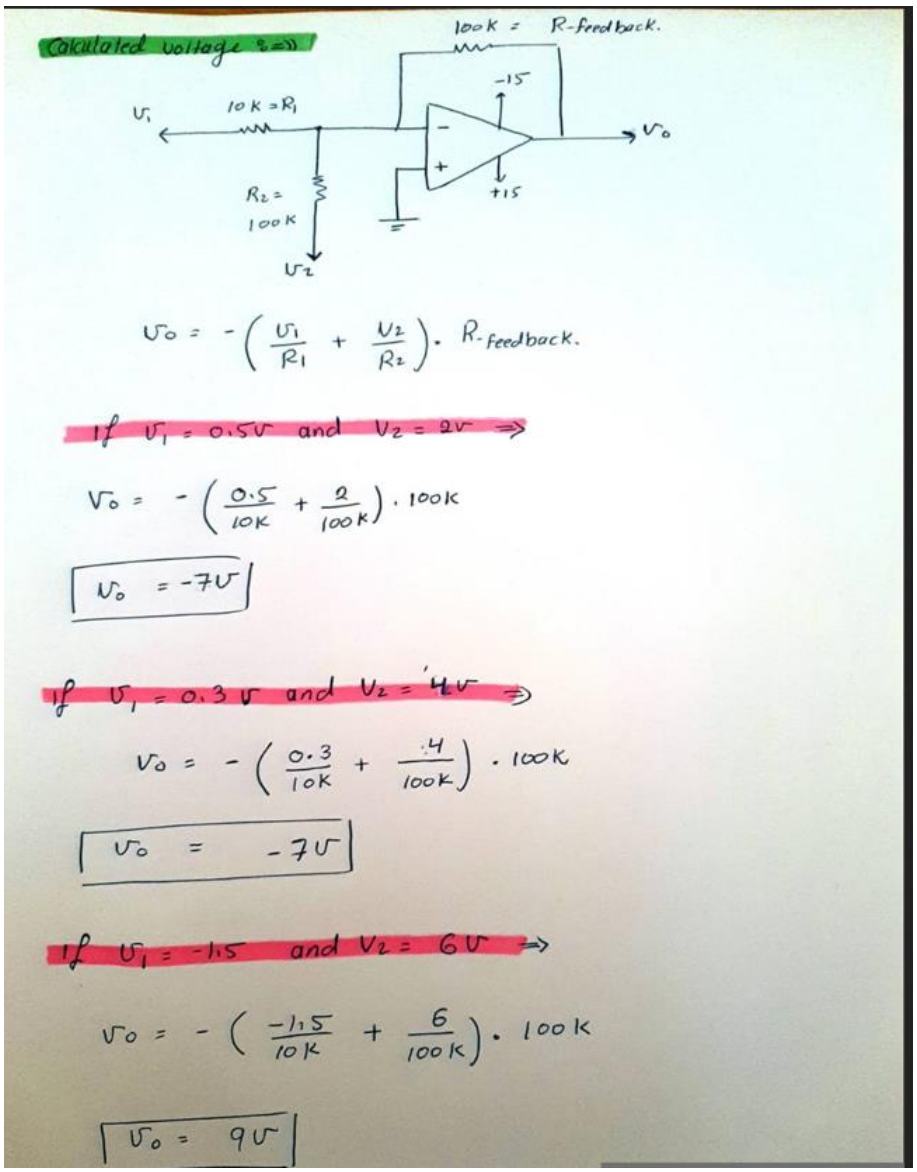
- If $V_1 = 0.3v$ and $V_2 = 4v$, then V_0=:



- If $V_1 = -1.5v$ and $V_2 = 6v$, then V_0=:



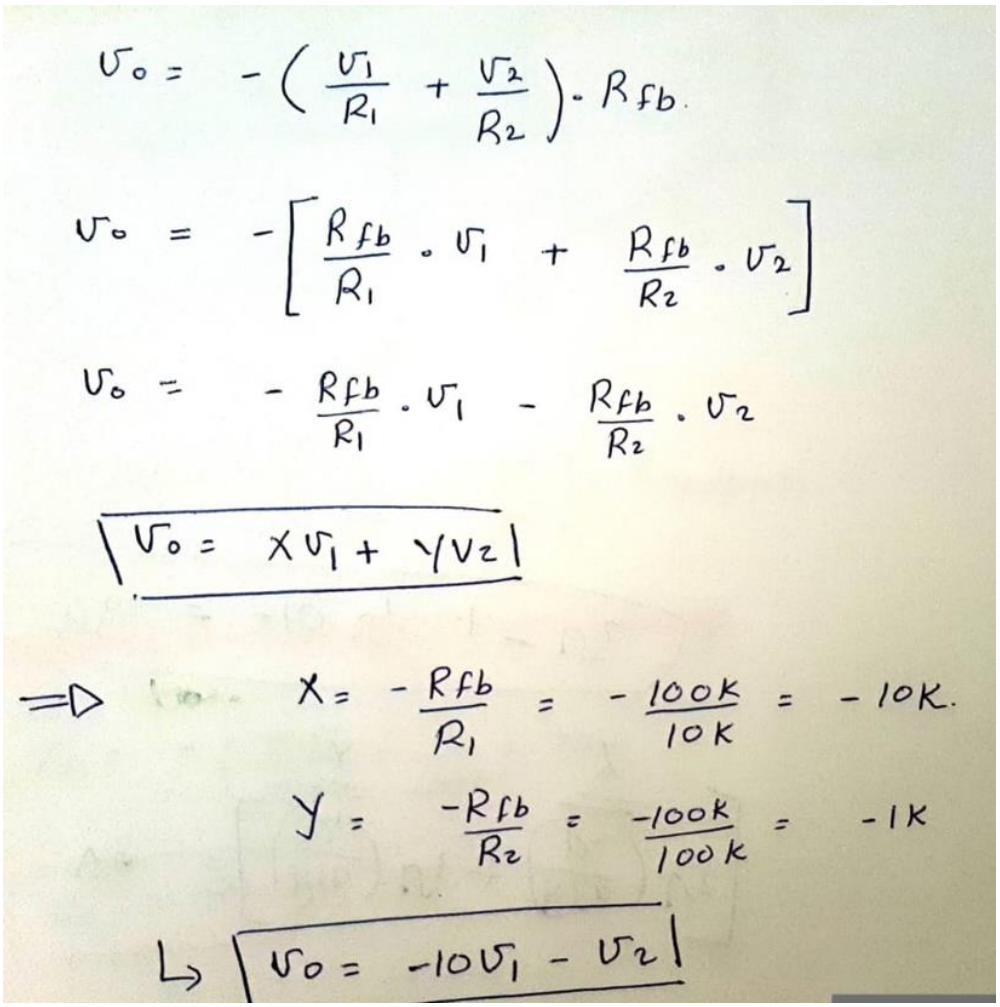
1.1 Calculated voltage



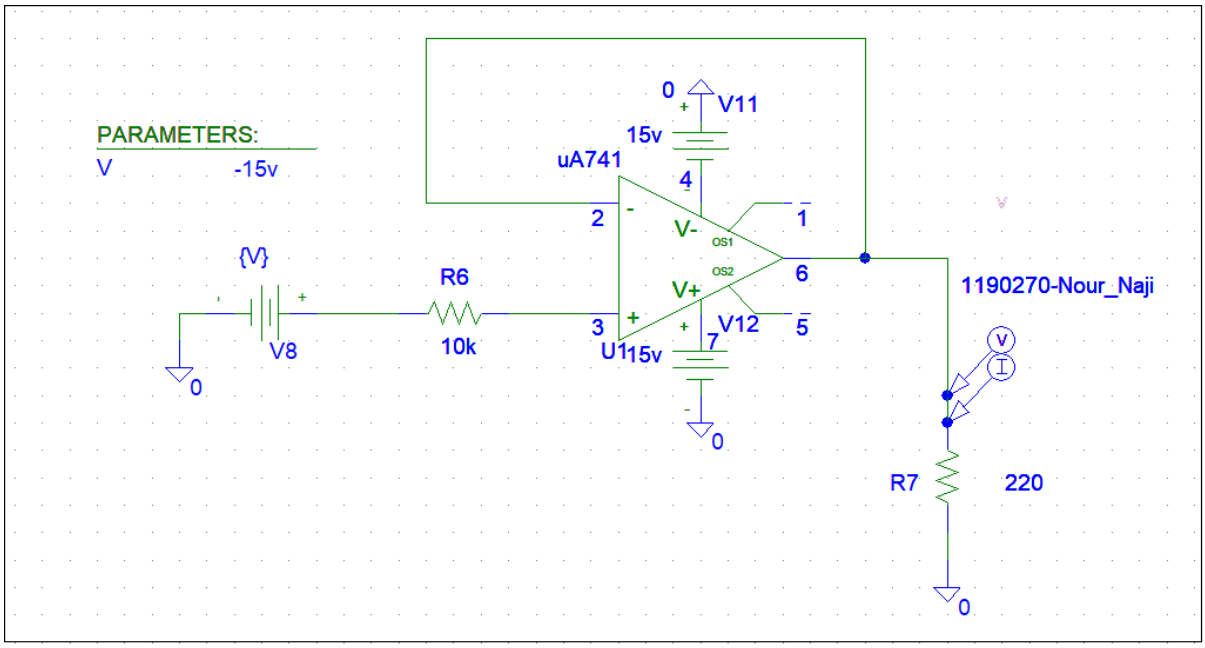
- By comparing the values obtained from the simulation with the calculated ones we notice that they are approximately equal

Input voltage		Output voltage	
V_1	V_2	V_0	Calculated voltage
0.5	2	-6.993	-7
0.3	4	-6.993	-7
-1.5	6	9.008	9

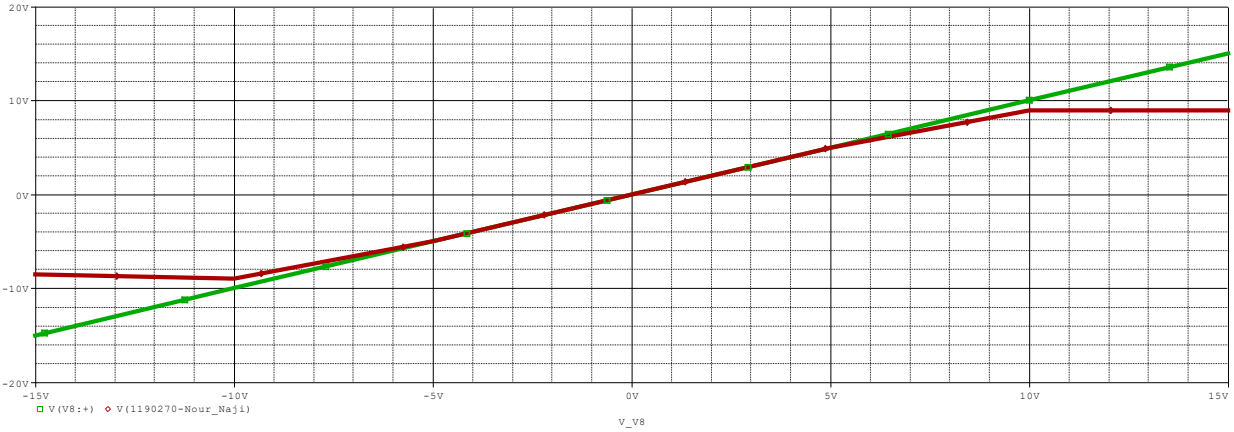
- Write The expression relating Vo to V1 and V2: i.e. $Vo = XV_1 + YV_2$ (Find X, Y)



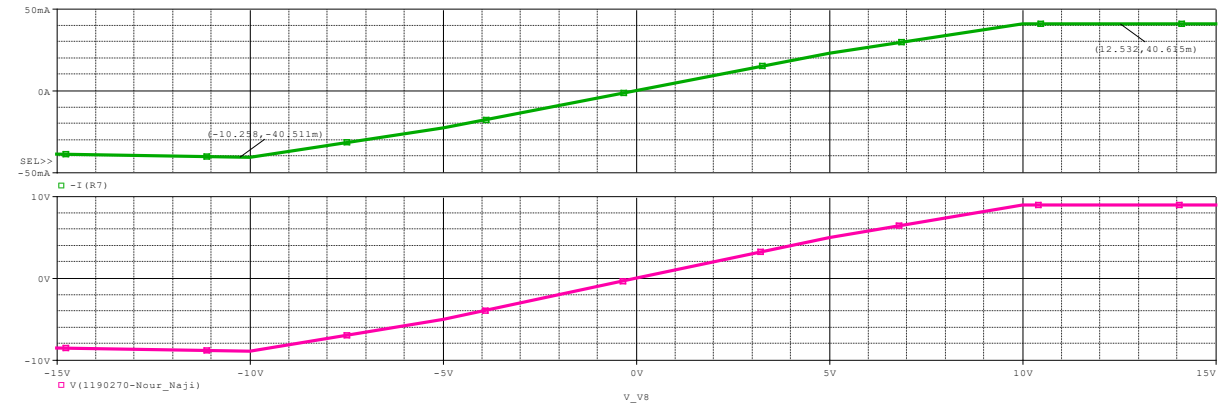
2. Voltage Follower application:



- Transient Plot Vo and observe the relationship between Vo and Vi:



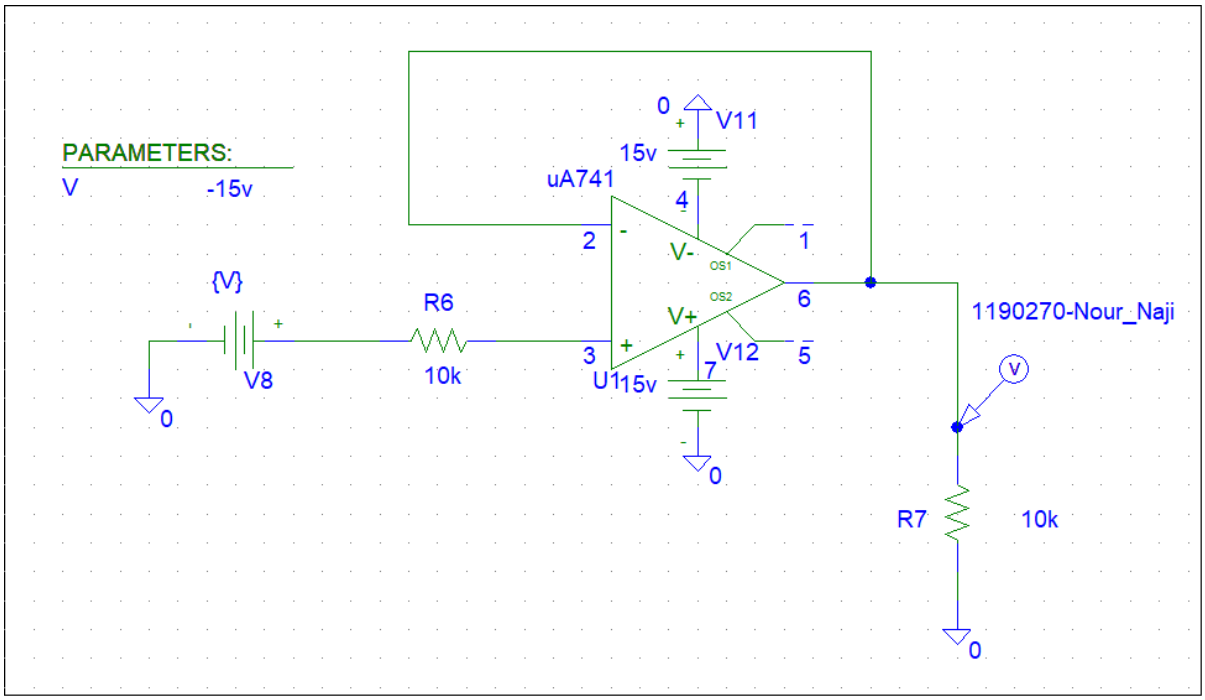
- Transient Plot Io and observe its behavior?



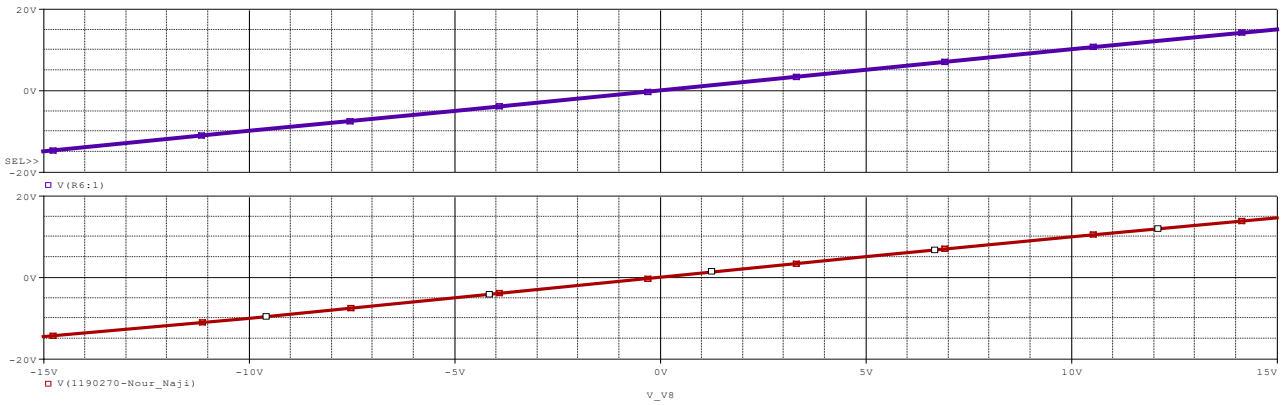
In this part we have current limit at 40mA this leads to voltage limit at approximately 8.935v

- Transient Repeat 2,3,4 but with the 220-ohm resistor replaced by 10 k

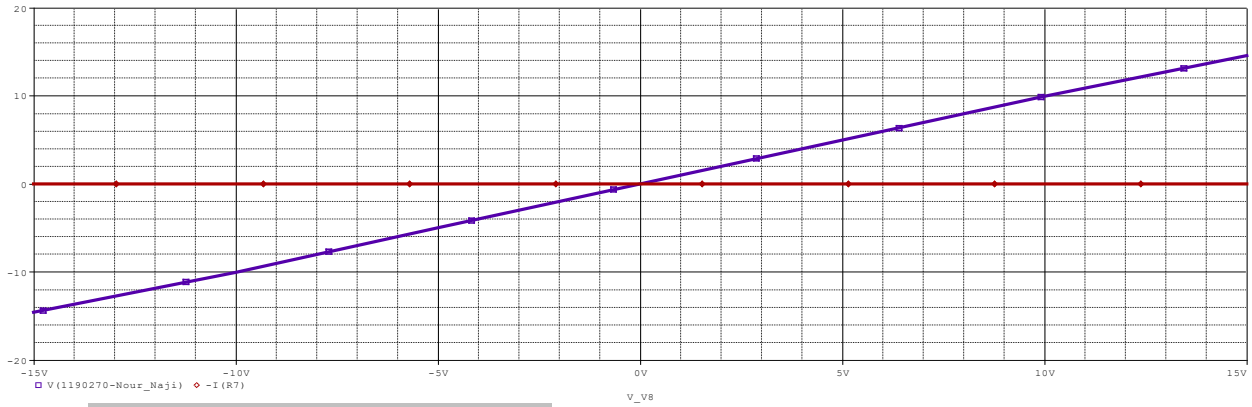
When the resistor is replaced by 10k ohm the results become as follows:



- Transient Plot Vo and observe the relationship between Vo and Vi:



- Transient Plot Io and observe its behavior?



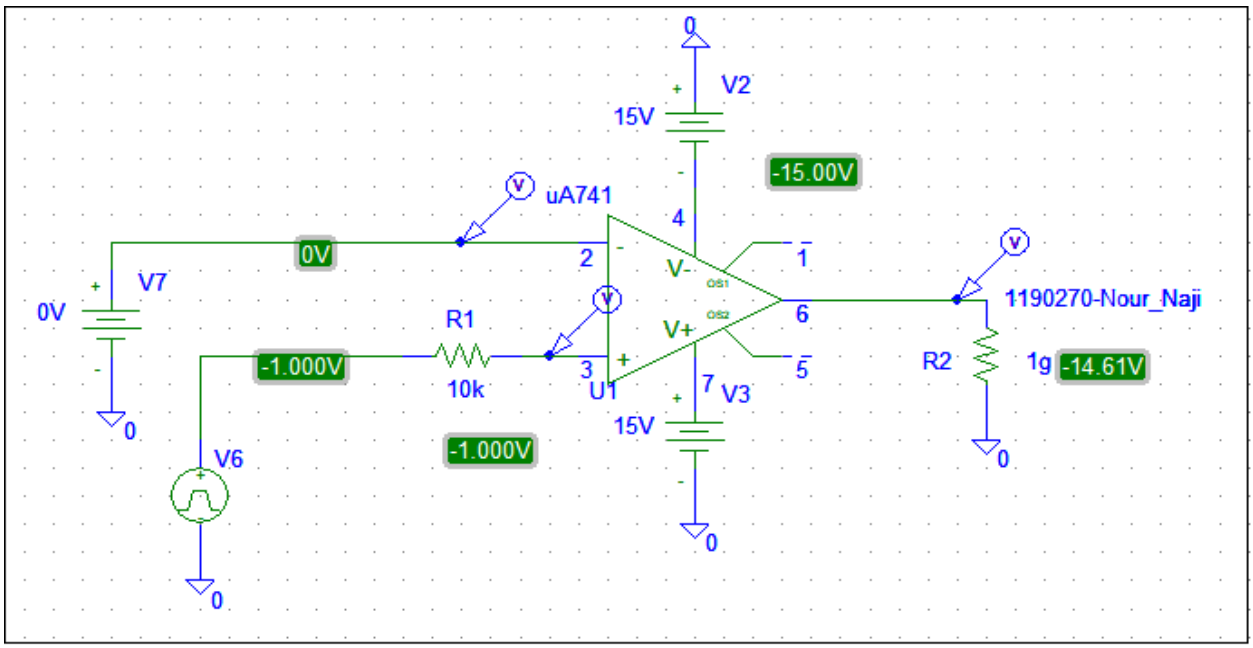
⇨ In this part there is no current limit.

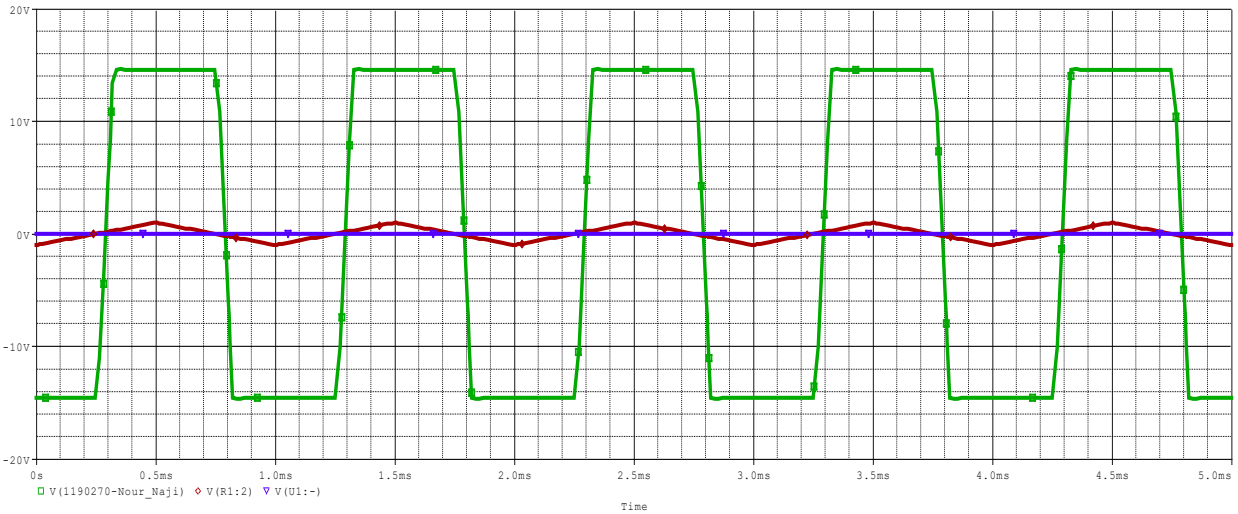
3. Comparator Application:

⇨ In Opamp comparator

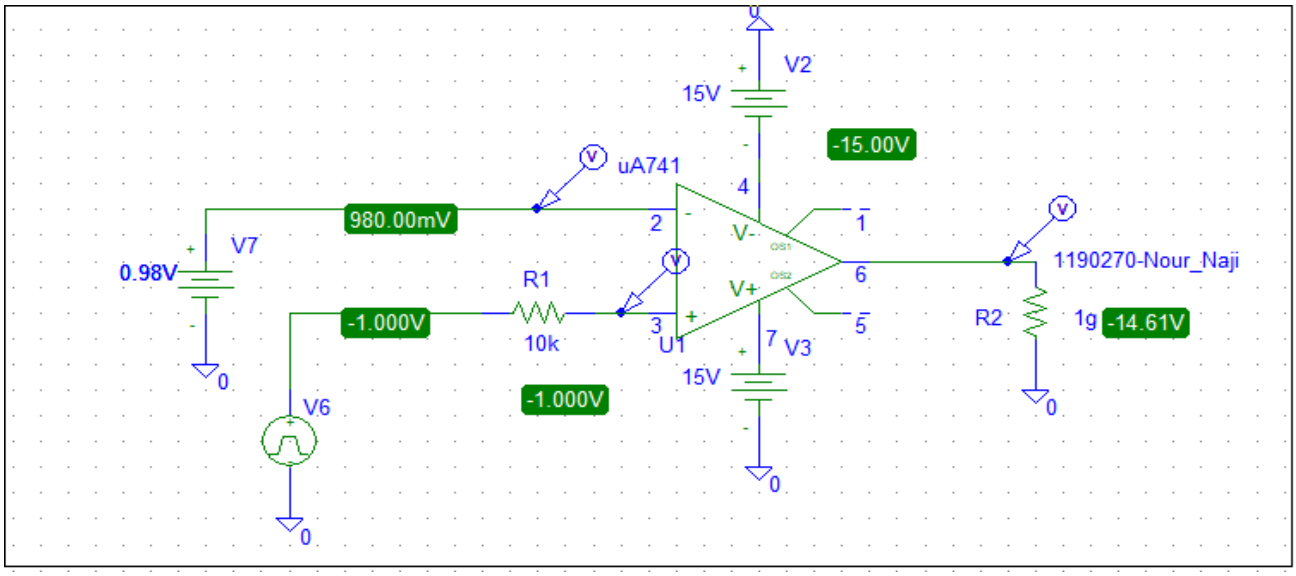
- If V (+) > V (-) -> Vo = +Vsat
- If V (+) < V (-) -> Vo = -Vsat

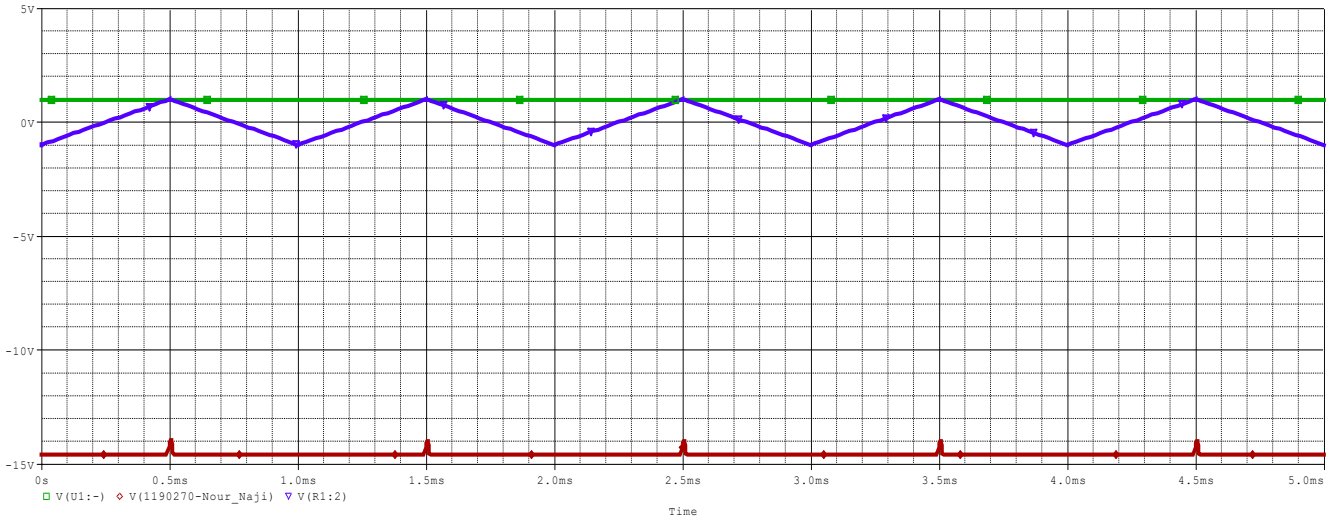
➢ **V1 = 0V**



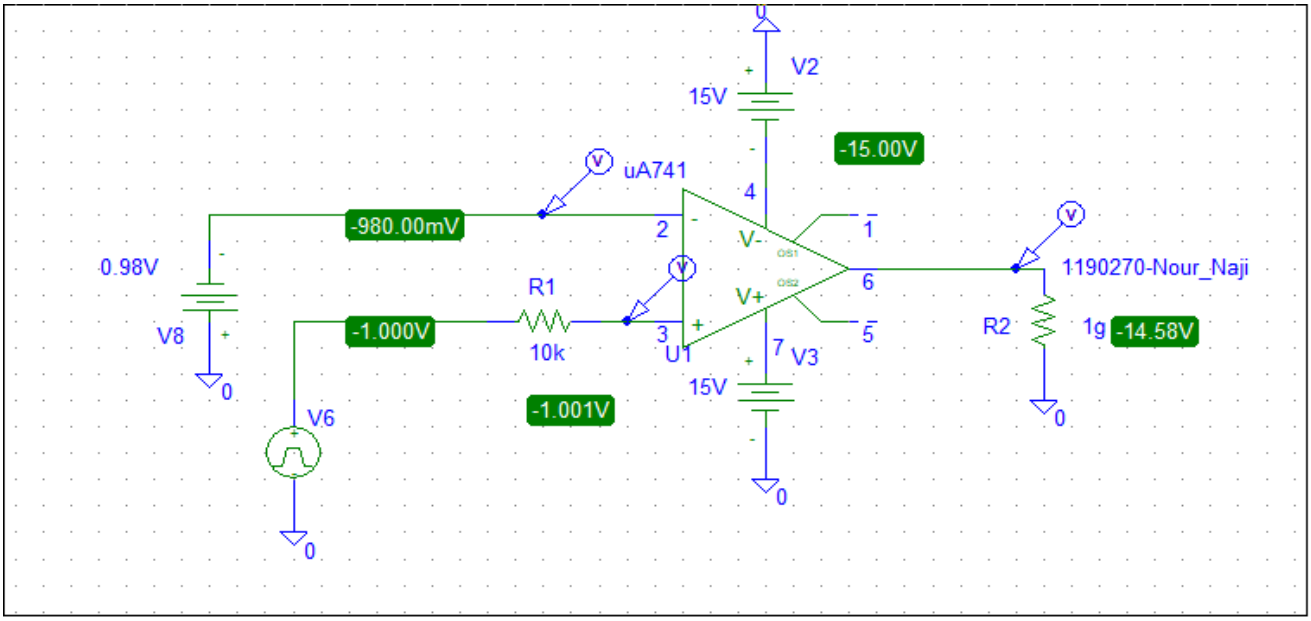


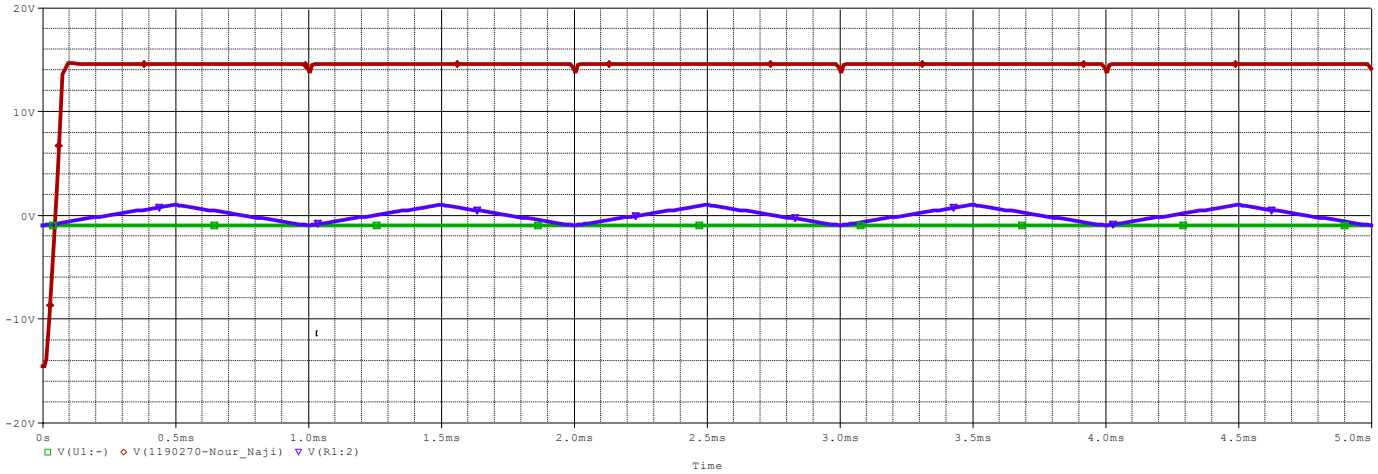
- **V1 = 0.98V**


V2
15V
-15.00V
uA741
980.00mV
V7
0.98V
R1
10k
-1.000V
-1.000V
V6
U1
V3
15V
1190270-Nour_Naji
R2
1g
-14.61V
0


5V
0V
-5V
-10V
-15V
0s
0.5ms
1.0ms
1.5ms
2.0ms
2.5ms
3.0ms
3.5ms
4.0ms
4.5ms
5.0ms
V(U1:-)
V(1190270-Nour_Naji)
V(R1:2)
Time

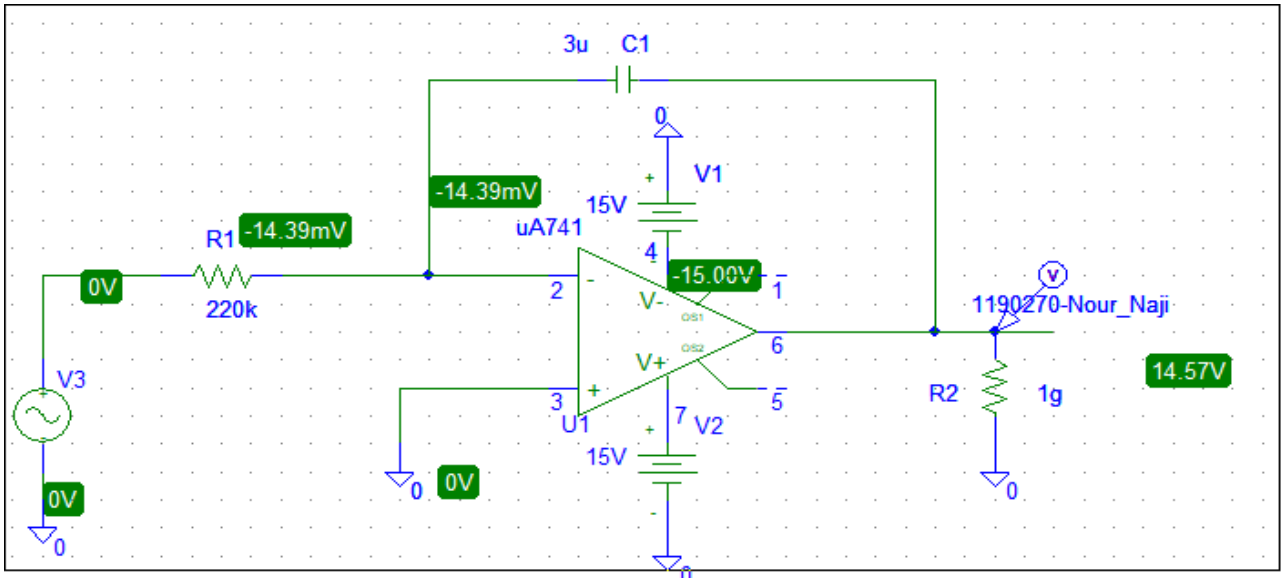
- **V1 = -0.98V**

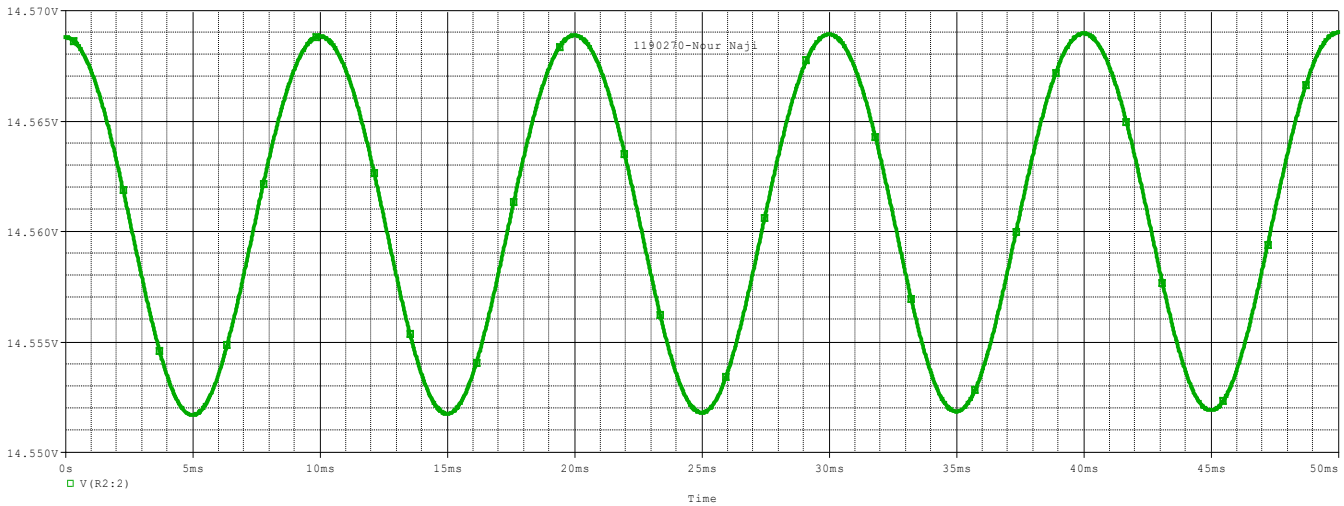

V2
15V
-15.00V
uA741
-980.00mV
0.98V
V8
0
R1
10k
-1.000V
-1.001V
V6
0
V-
V+
U1
15V
V3
0
1190270-Nour_Naji
R2
1g
-14.58V
0


20V
10V
0V
-10V
-20V
0s
0.5ms
1.0ms
1.5ms
2.0ms
2.5ms
3.0ms
3.5ms
4.0ms
4.5ms
5.0ms
V(U1:-)
V(1190270-Nour_Naji)
V(R1:2)
Time

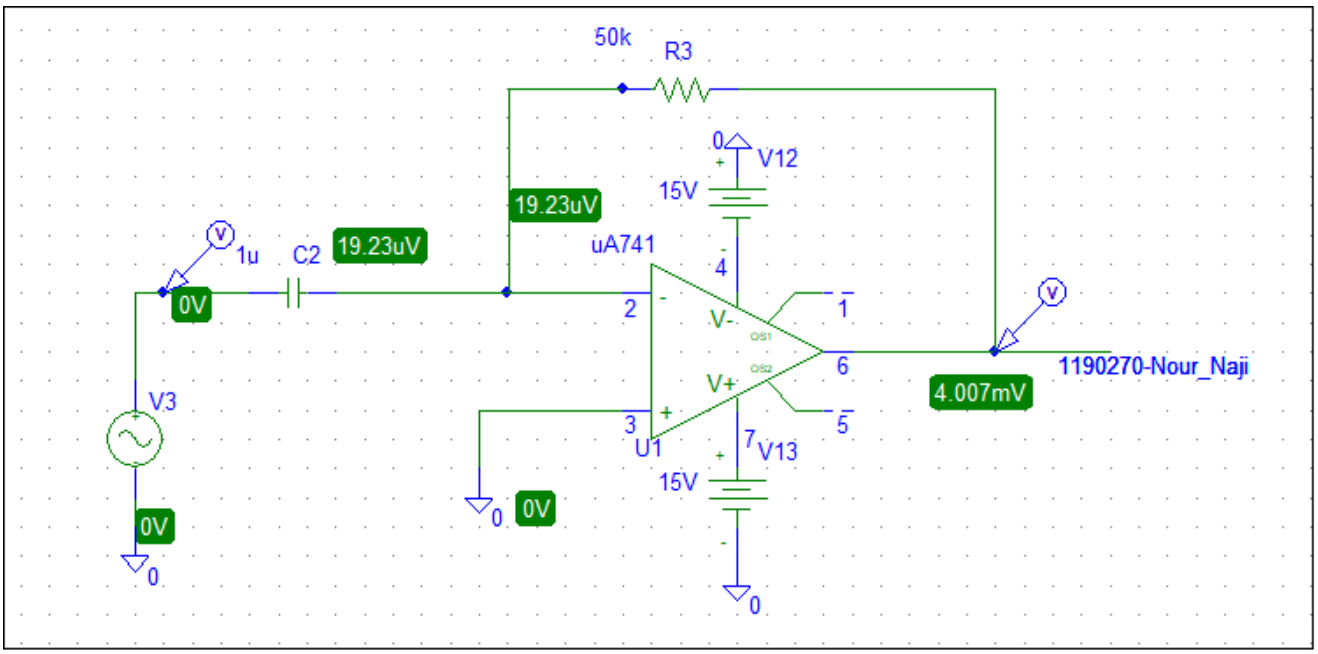
4. Integrator and Differentiator:

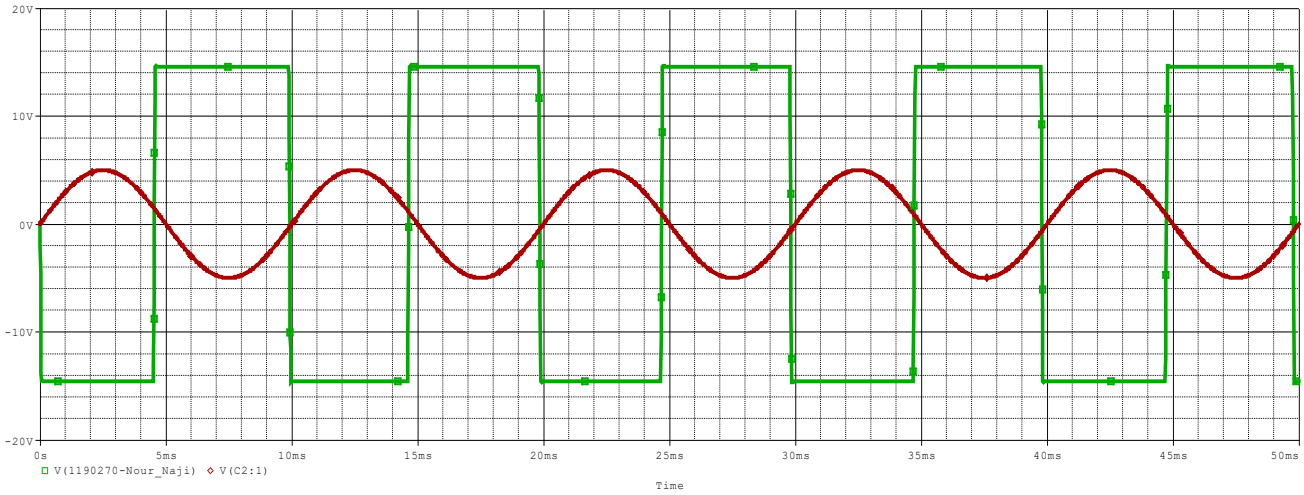
4.1. Integrator:



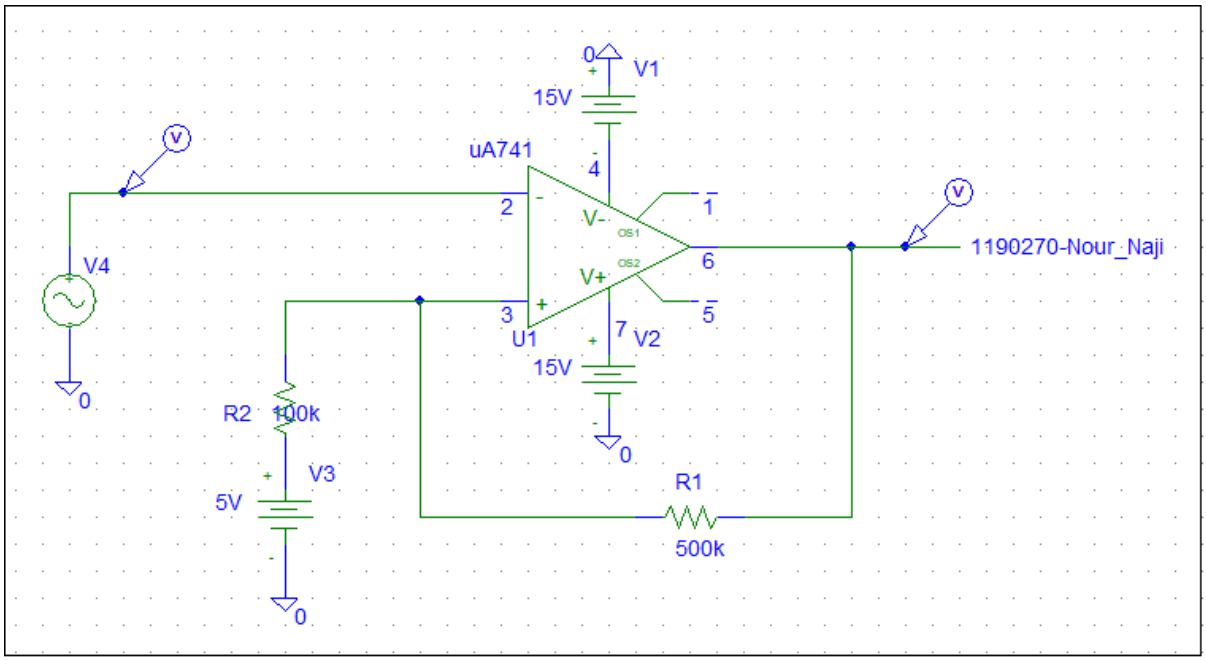


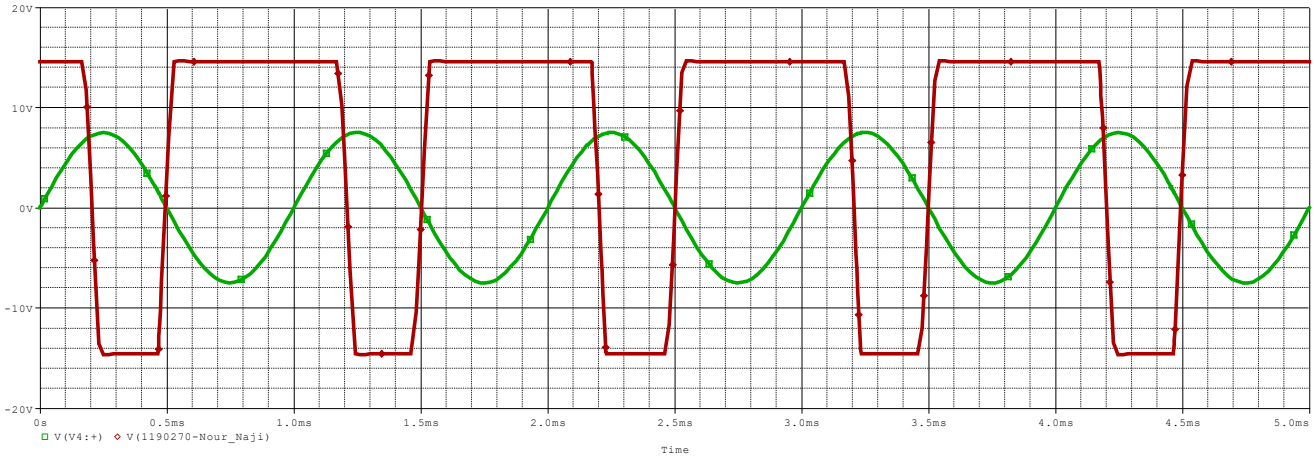
4.2 Differentiator:





5. To investigate the effect of adding hysteresis





The reference voltage at the non-inverting input changes creating two different reference voltage values and two different switching points. One point being called the Upper Trip Point (UTP), while the other is called the Lower Trip Point (LTP). The difference between these two trip points is known as Hysteresis.