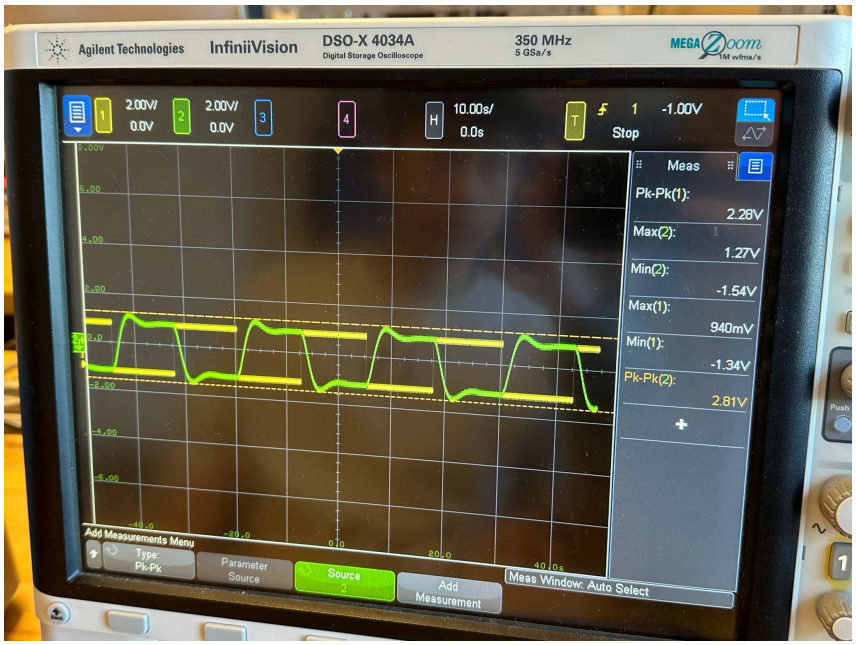
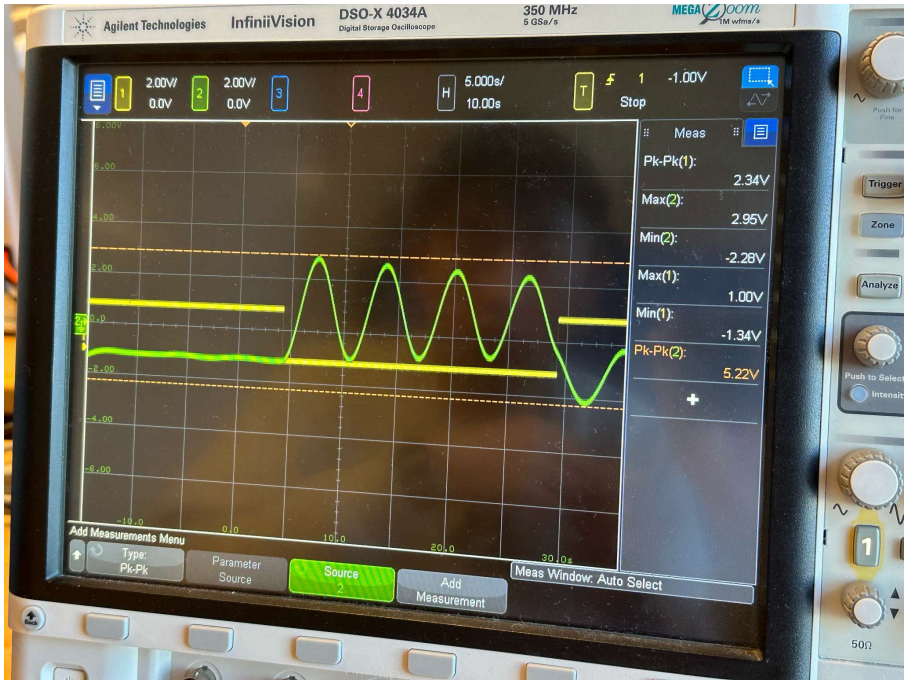
a)

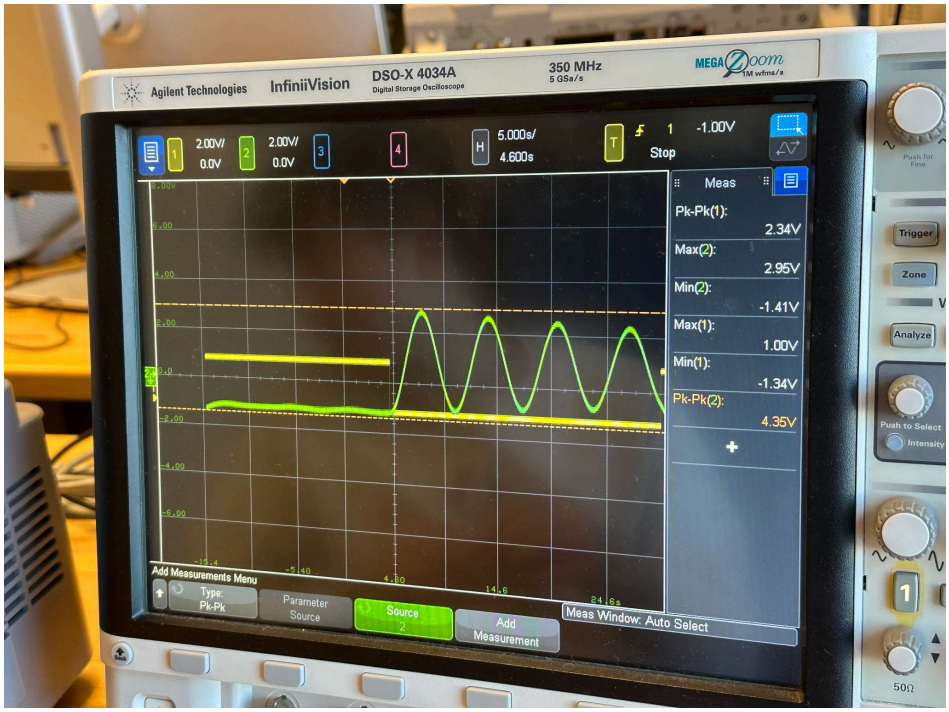
- A 2V pk to pk square wave was used instead of 1V because it gave clearer traces



b)

- In shorting R3, damping decreases. The output oscillates, showing underdampness.




Agilent Technologies
InfiniiVision
DSO-X 4034A
Digital Storage Oscilloscope
350 MHz
5 GSa/s
MEGA Zoom
1M wfms/s
2.00V/
0.0V
2.00V/
0.0V
5.000s/
4.600s
1
-1.00V
Stop
Meas
Pk-Pk(1):
2.34V
Max(2):
2.95V
Min(2):
-1.41V
Max(1):
1.00V
Min(1):
-1.34V
Pk-Pk(2):
4.35V
Add Measurements Menu
Type:
Pk-Pk
Parameter
Source
Source
2
Add
Measurement
Meas Window: Auto Select
Trigger
Zone
Analyze
Push to Select
Intensity
50Ω


Agilent Technologies
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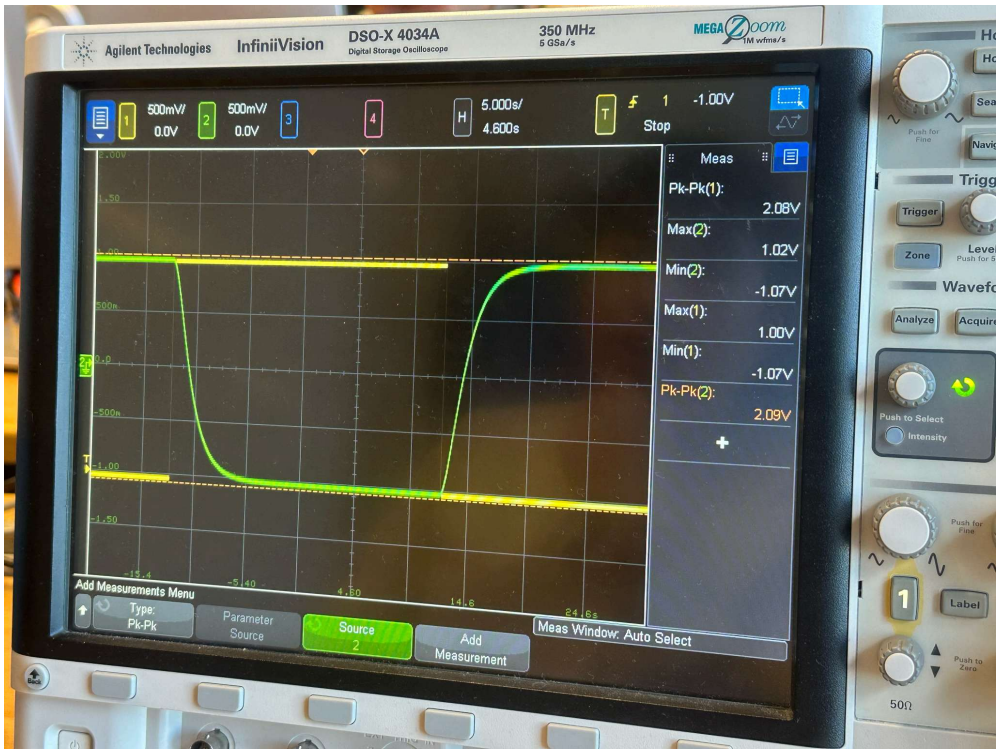
DSO-X 4034A
Digital Storage Oscilloscope
350 MHz
5 GSa/s
MEGA Zoom
1M wfms/s
500mV/
0.0V
500mV/
0.0V
5.000s/
4.600s
1
-1.00V
Stop
Meas
Pk-Pk(1):
1.27V
Max(2):
1.54V
Min(2):
-1.41V
Max(1):
470mV
Min(1):
-800mV
Pk-Pk(2):
2.95V
Add Measurements Menu
Type:
Pk-Pk
Parameter
Source
Source
2
Add
Measurement
Meas Window: Auto Select

c)

- Critically Damped (as expected, it drops to steady state very quickly):



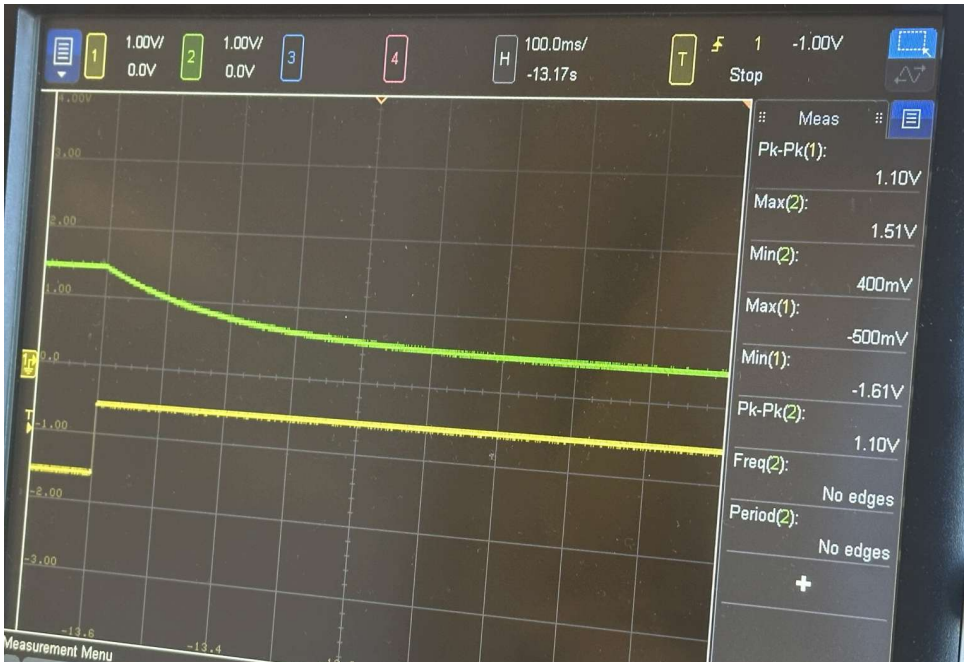
- Underdamped (0.2 M):

- Overdamped (20M):

d)

- Underdamped (R3 = 0.2Meg underdamped case. We also can see the faster frequency of the underdamped oscillations):

- Overdamped Case (R3 = 20Meg):



- Critically Damped Case:

- It can be seen the critically damped case settles to equilibrium much more quickly than the underdamped case.