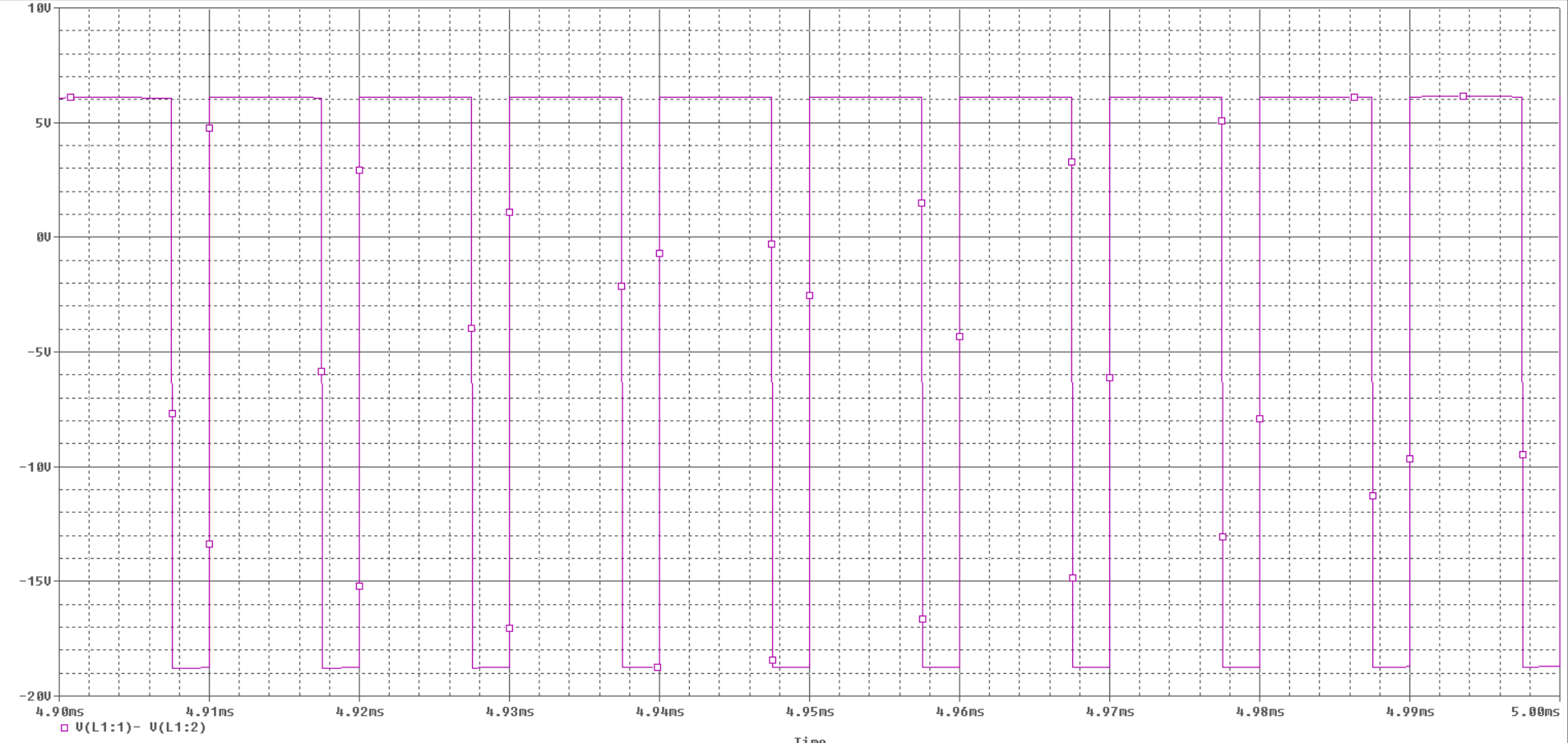
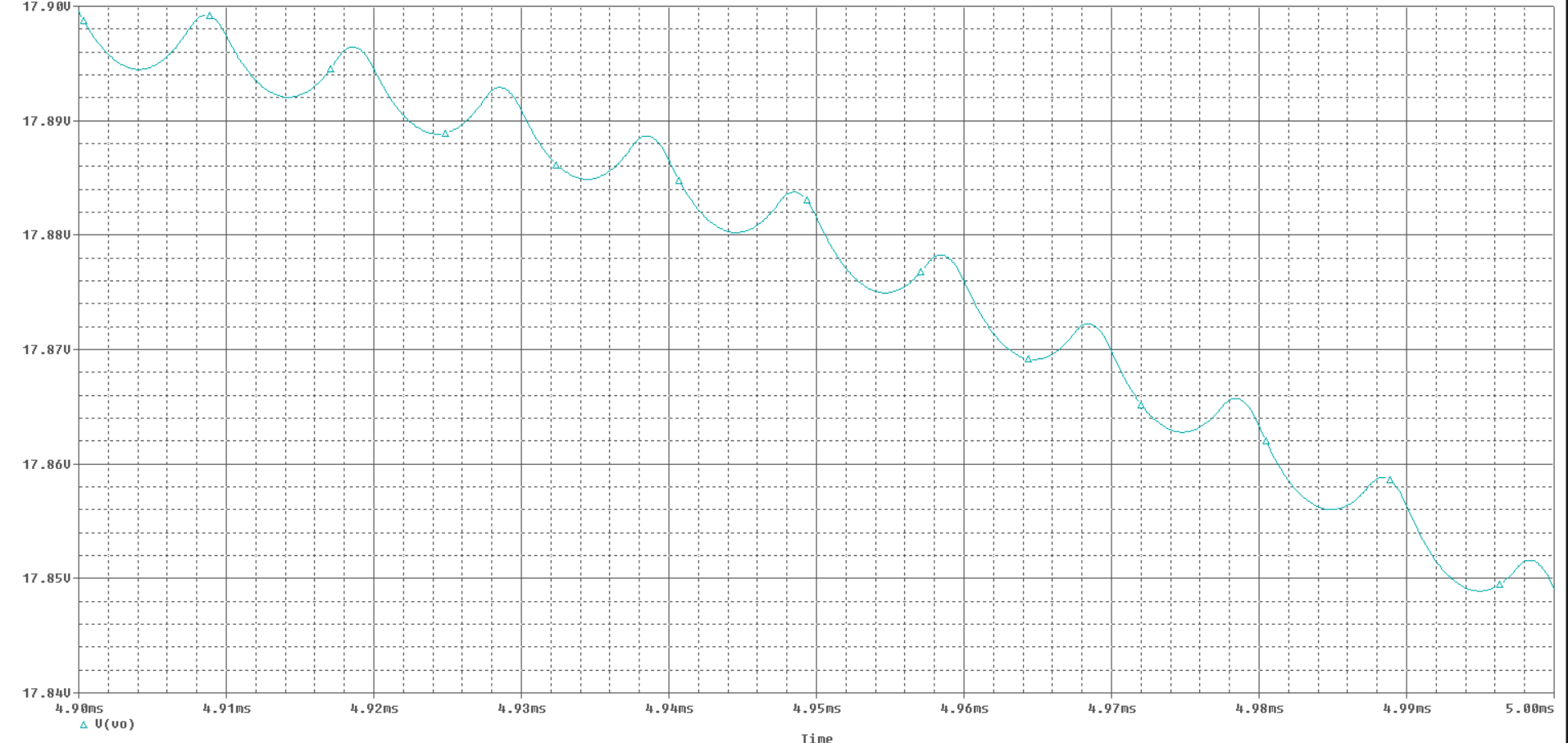
# EE584 Simulation Assignment #1 – Buck Converter

1.

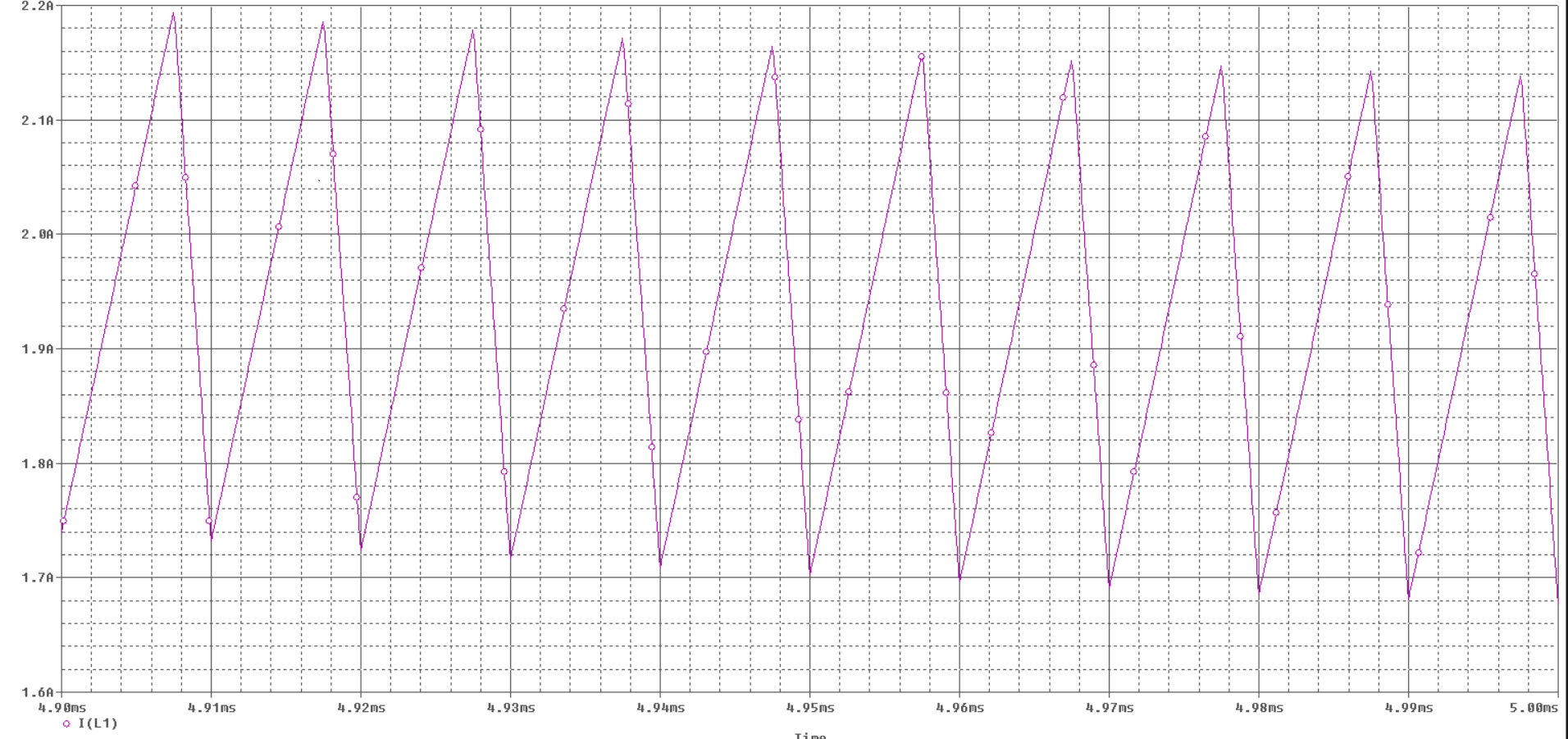
## VL



## Vo



## IL



2.

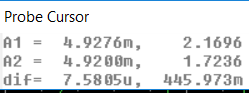
## Average value of Vl



3.

## IL





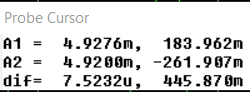
Measured peak-to-peak value = 446.973 m

Calculated peak-to-peak value by →

4)

## IC





iC follows the same waveshape as the ripple in iL, and has almost an identical peak to peak current. Average value is approximately 0.

5)

## Iin

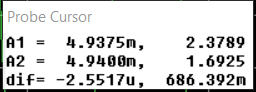


Average value of Iin = 1.48A

Theoretical value computed by →

6)

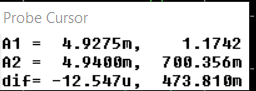
New value for inductor gives the following ∆iL



Which is similar to the one which was required

7)

Output power is halved by changing R from 9 Ω to 18 Ω.



In spite of the fact that the load has been halved, the peak-to-peak value of the inductor current remains approximately the same. This is because the peak-to-peak current isn’t affected by the changing load (see equation EQ 3-16, it’s only dependent on Vin, Vo, D, L, and Ts)

8)

## IL



As the graph shows, the converter is operating in the critical condition mode (since IL goes to 0 at the end of each cycle)

# Buck-boost-converter

1)

## IL



## VL



## Vo



2)

## Average value of VL



3)

## IL





Measured peak-to-peak value = 742.859 mA

Calculated peak-to-peak value by →

4)IC/IDiode



The capacitor current follows the ripple in the diode by an offset of -2A (the output current). The average value of the capacitor current (shown by the blue line) is approximately 0.

5)

## Iin



The average value of Iin is shown in the red line. It is about 5.79A.

Theoretical value computed by →

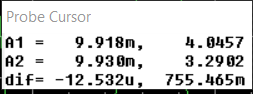
6)



Measured value for ∆il is 658.6 mA which is similar that the one which was required.

7)

Output power is halved by changing R from 15 Ω to 30 Ω.



In spite of the fact that the load has been halved, the peak-to-peak value of the inductor current remains approximately the same. This is because the peak-to-peak current isn’t affected by the changing load (see equation EQ 3-28, it’s only dependent on Vin, D, L, and Ts)

8)



As the graph shows, the converter is operating in the critical condition mode (since IL goes to 0 at the end of each cycle)