ELEC 2120-005
Lab 7 – Laplace MATLAB
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INTRODUCTION

The purpose of this lab was to solve an s-domain circuit. This was done using MATLAB as a vital instrument to perform challenging calculations very quickly.

EXERCISES

The original circuit from the lab manual was transformed to an s-domain circuit shown below in Figure 1. The corresponding matrix generated from the mesh equation is also shown in Figure 1 as well as in the MATLAB .m file.

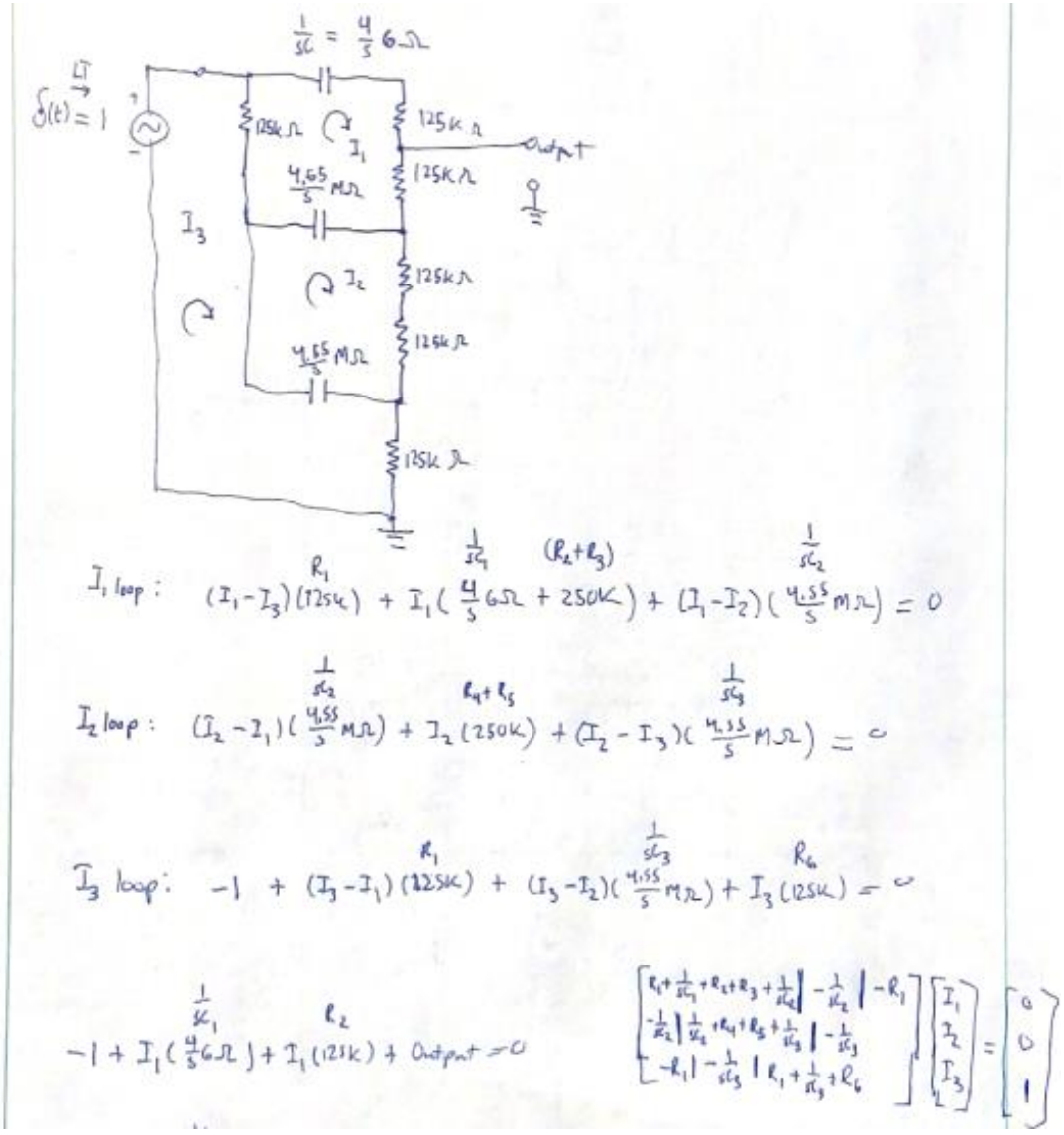
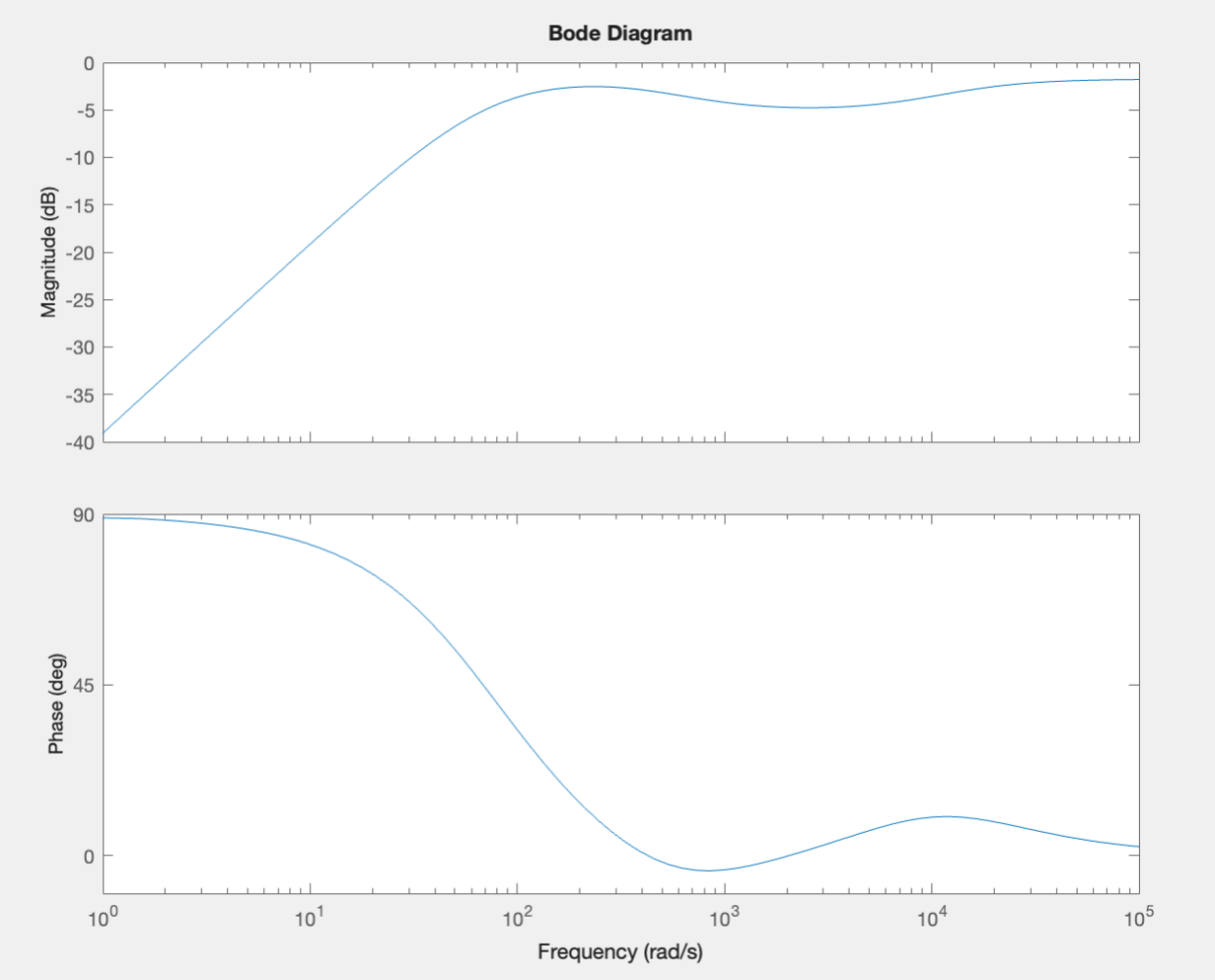


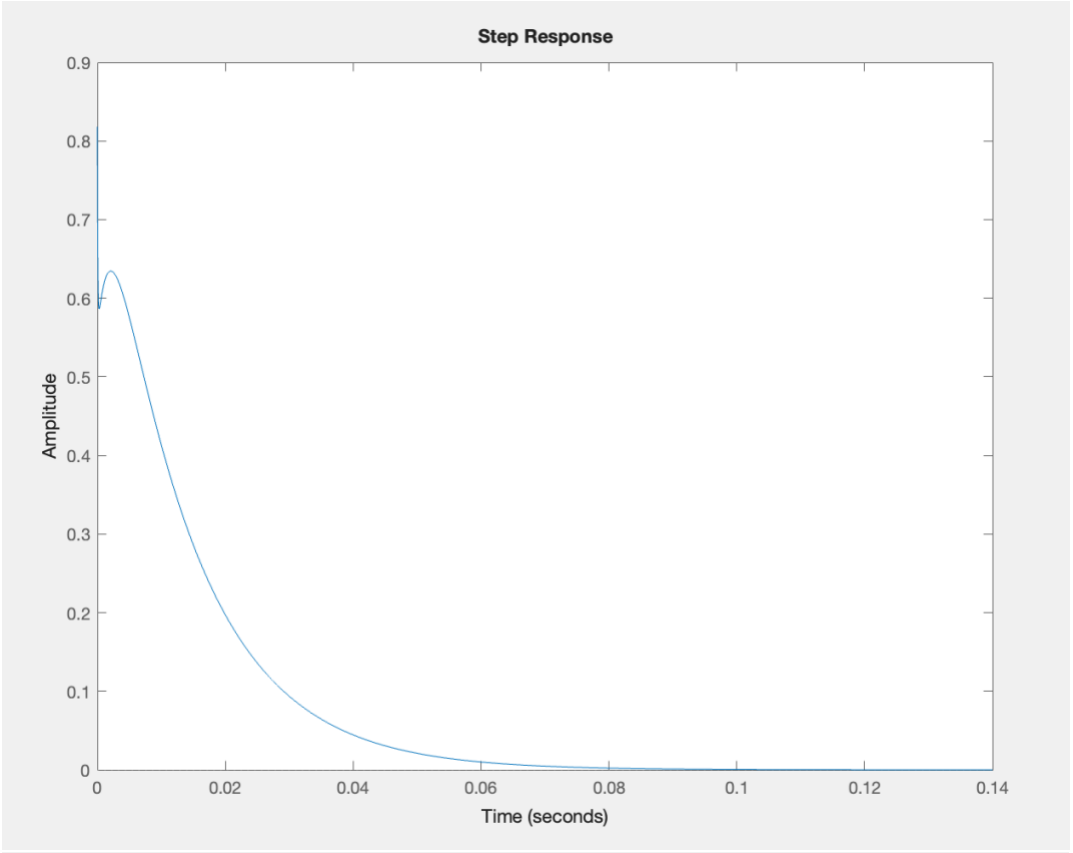
Figure 1. s-domain circuit

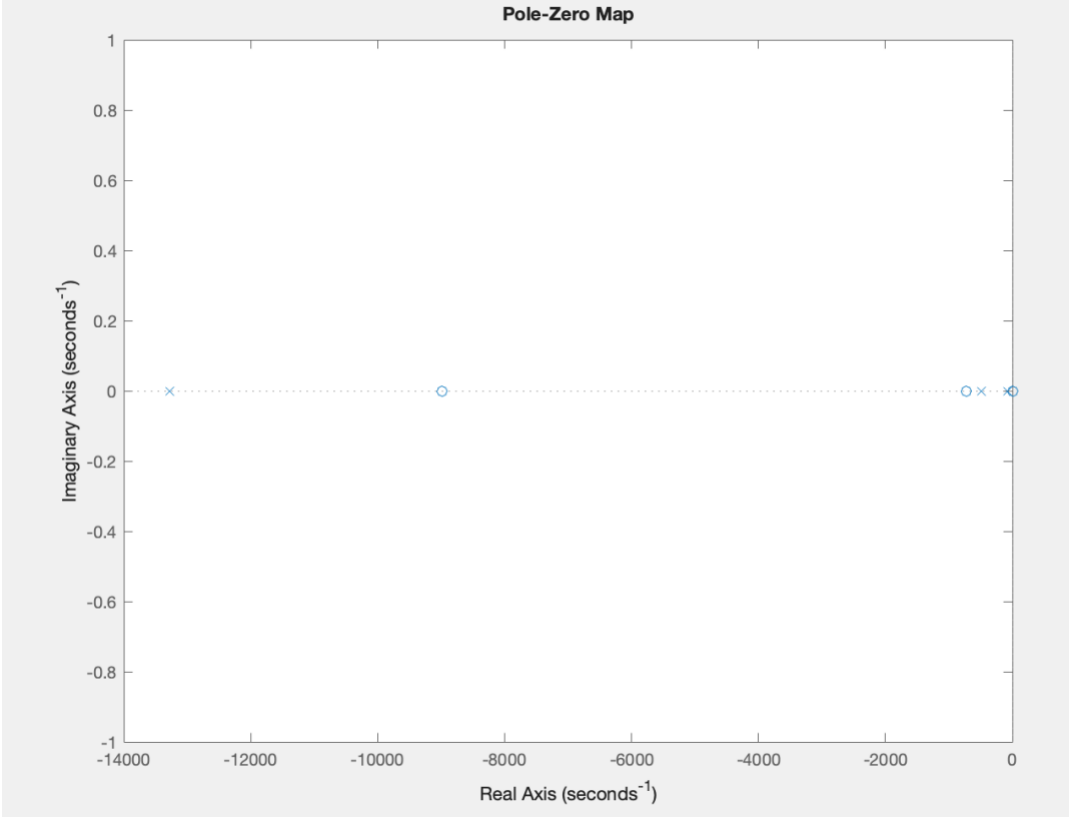
The V_out equation was derived by doing a KVL loop starting at the output and moving to ground.

Np(1) show up as a 0 because the disp command only show 4 decimal places in the command window. Because Np(1) < 1e-4, it appears as 0.0000.

The bode, step, and pole zero plots are shown below. The bode plot seems to describe how the phasor of the transfer function changes as frequency changes. In other words, how the transfer function acts at different frequencies. The magnitude increases with frequency generally while the phase angle decreases generally.




Step Response
Amplitude
Time (seconds)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14


Pole-Zero Map
Imaginary Axis (seconds^{-1})
Real Axis (seconds^{-1})
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-14000
-12000
-10000
-8000
-6000
-4000
-2000
0

CONCLUSION

I enjoyed solving an actual circuit with MATLAB. It felt like I was actually using it as a tool to help me rather than just trying to get the code to work. No major issues other than having to install the control systems toolbox. No major adjustments.