ELEC 4700 Assignment 4
Circuit Modeling
April 7, 2019
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Part 1:

The code from this part was pulled from my PA 9 work which formulated the MNA equations to solve the nodal voltages and currents. The following 4 figures are plots from PA 9.

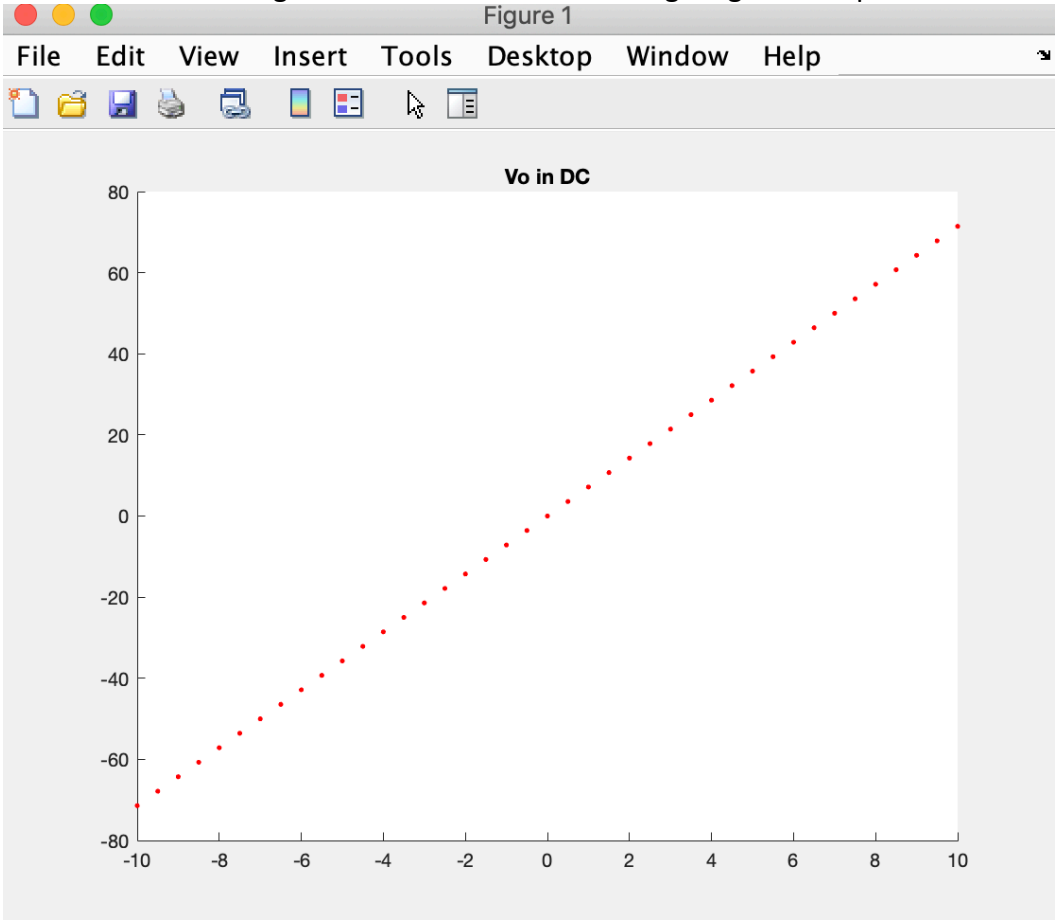

Figure 1: Voltage Output in DC

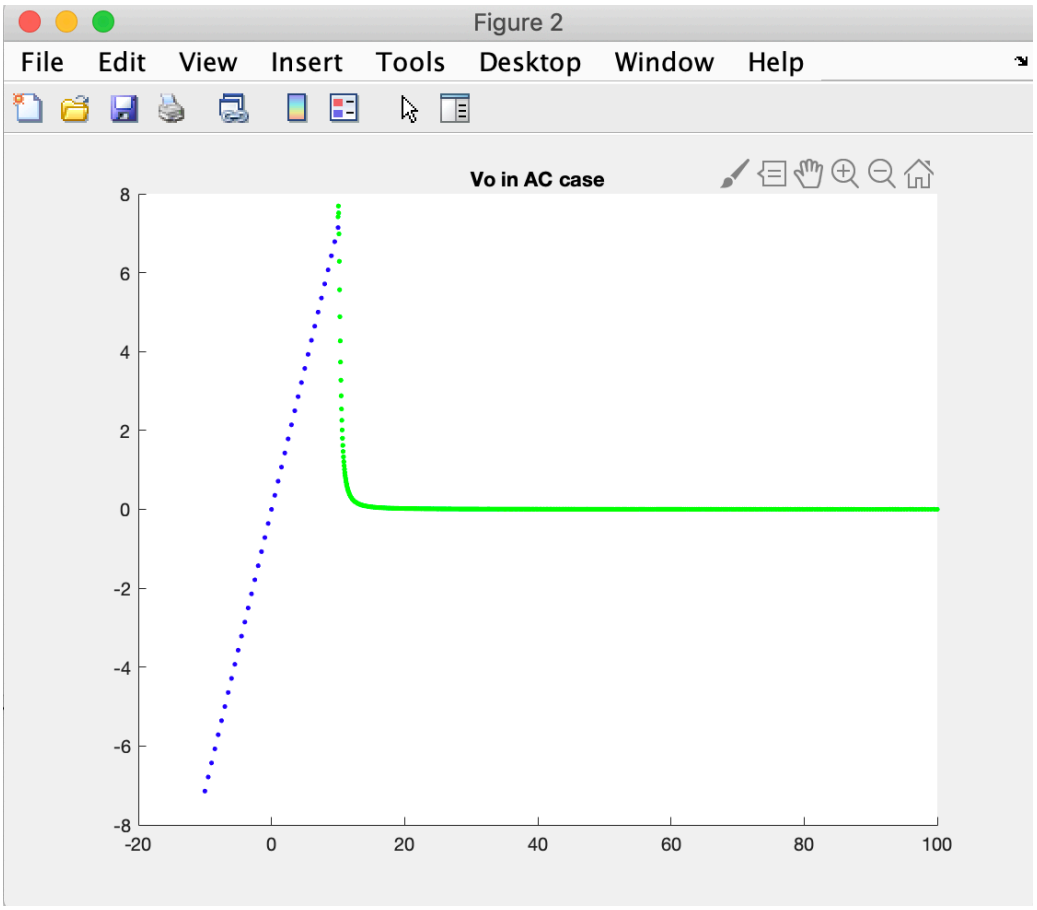

Figure 2: Output Voltage in AC

```
G= [G1 0 0 0 0 0 0;
    -G1 G1+G2 -1 0 0 0 0;
    0 1 0 -1 0 0 0;
    0 0 -1 G3 0 0 0;
    0 0 0 0 -a 1 0;
    0 0 0 G3 -1 0 0;
    0 0 0 0 0 -G4 G4+Go];
C= [0 0 0 0 0 0 0;
    -c c 0 0 0 0 0;
    0 0 -L 0 0 0 0;
    0 0 0 0 0 0 0;
    0 0 0 0 0 0 0;
    0 0 0 0 0 0 0;
    0 0 0 0 0 0 0];
```

G and C matrices

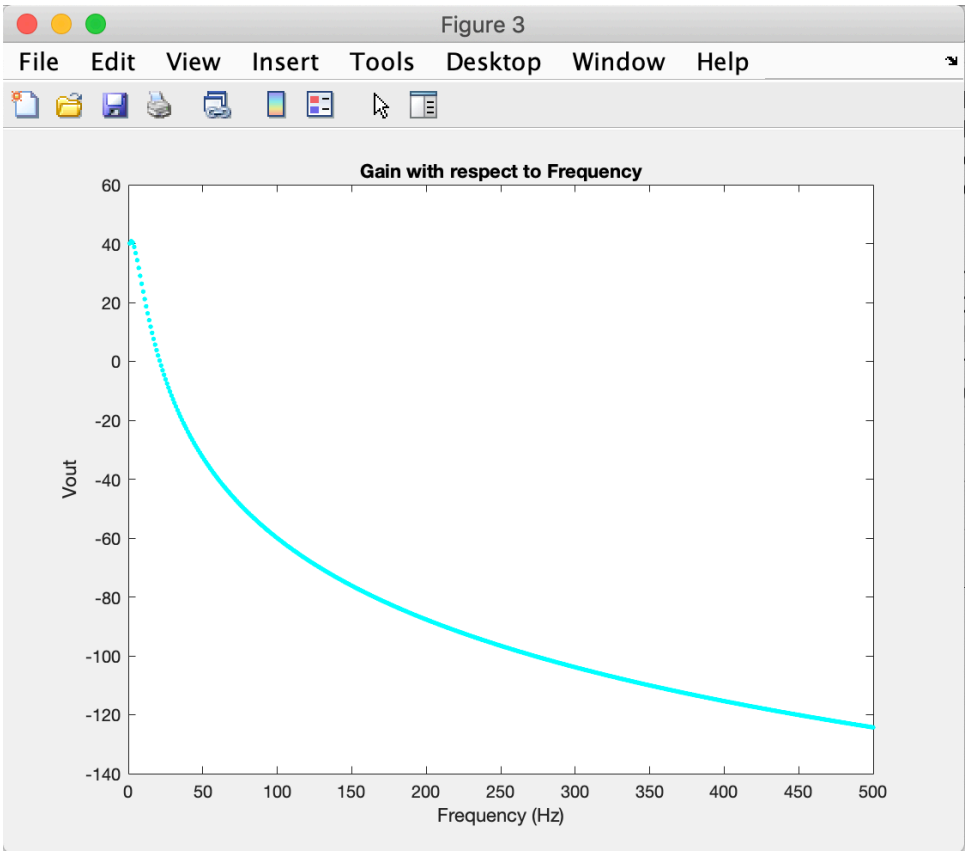

Figure 3: Voltage Gain compared to Frequency

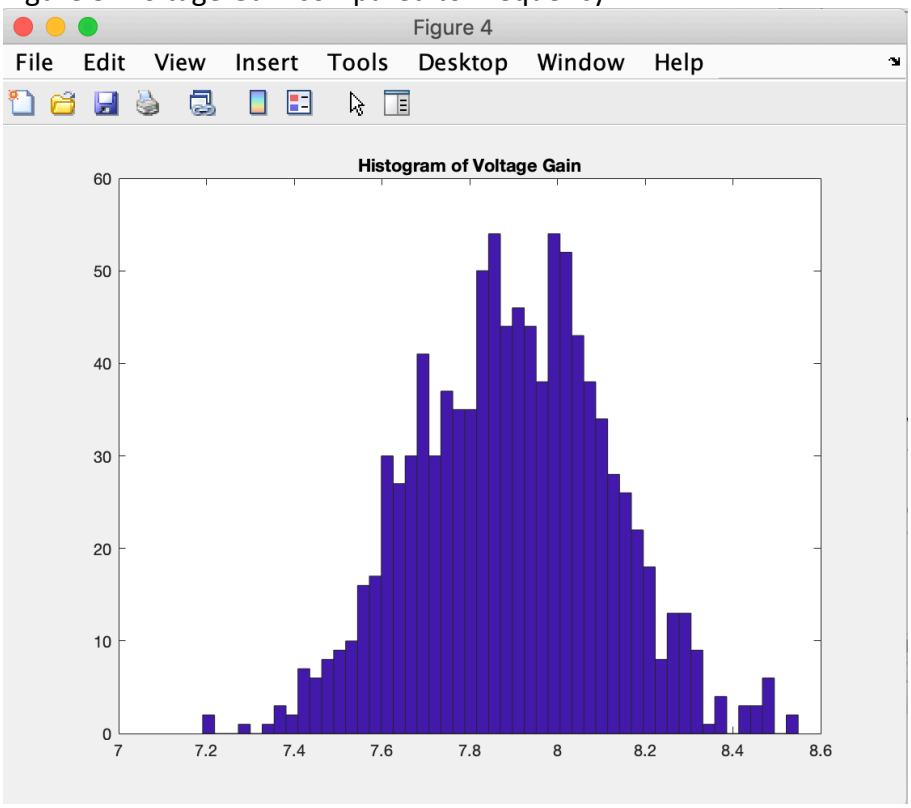

Figure 4: Histogram of Voltage Gain

Part 2:

The following figures will show the effects of a transient system compared to the original.

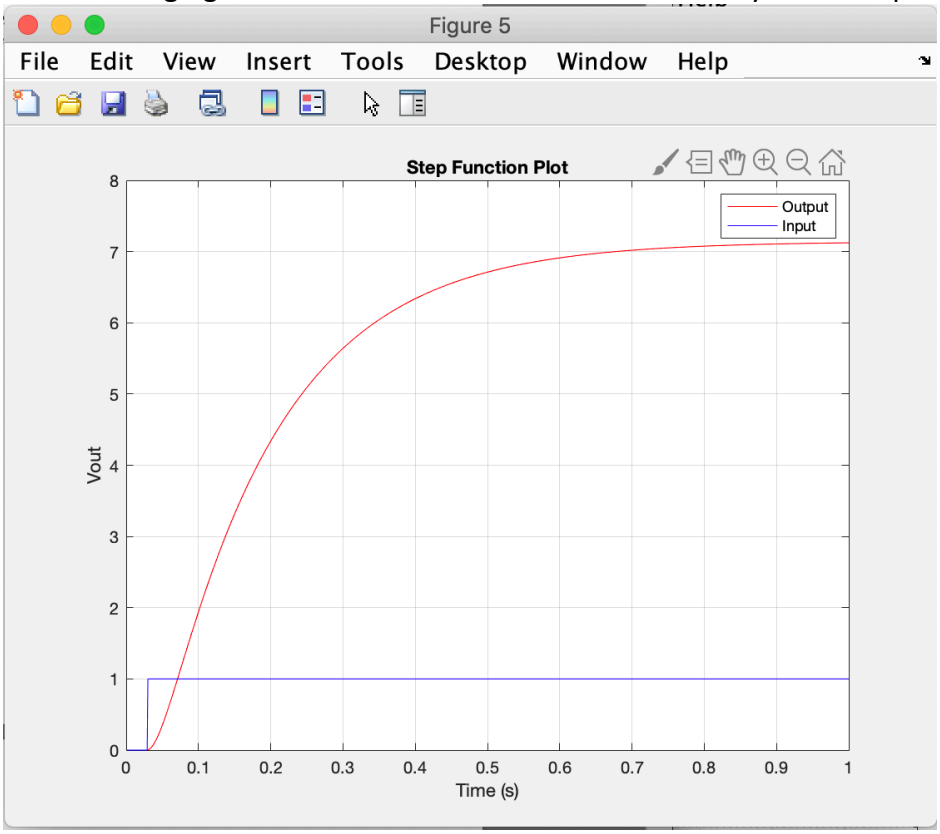

Figure 5: DC input and AC output

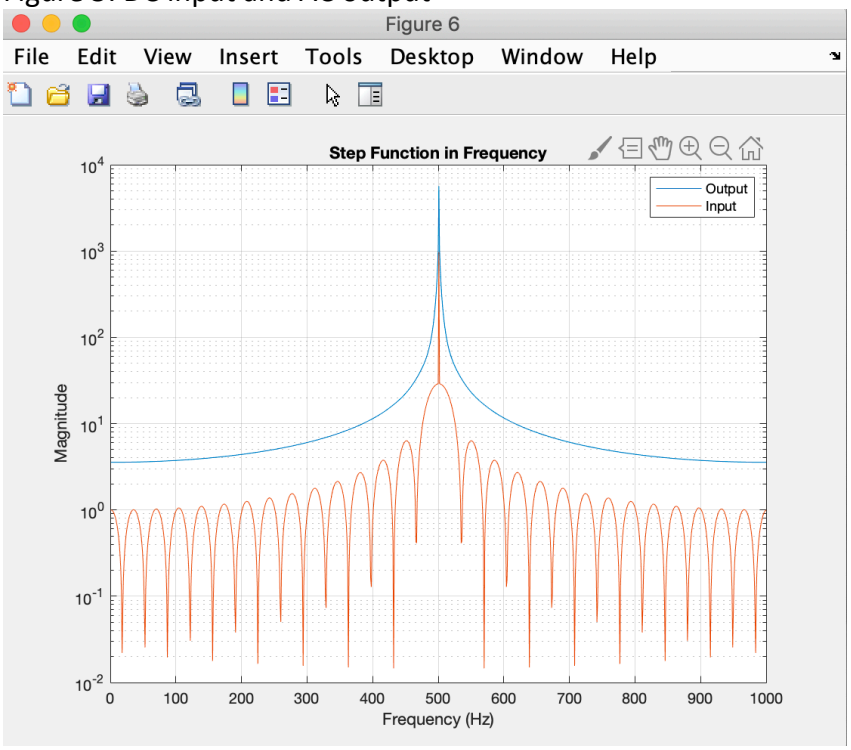

Figure 6: Vin and Vout with respect to Frequency

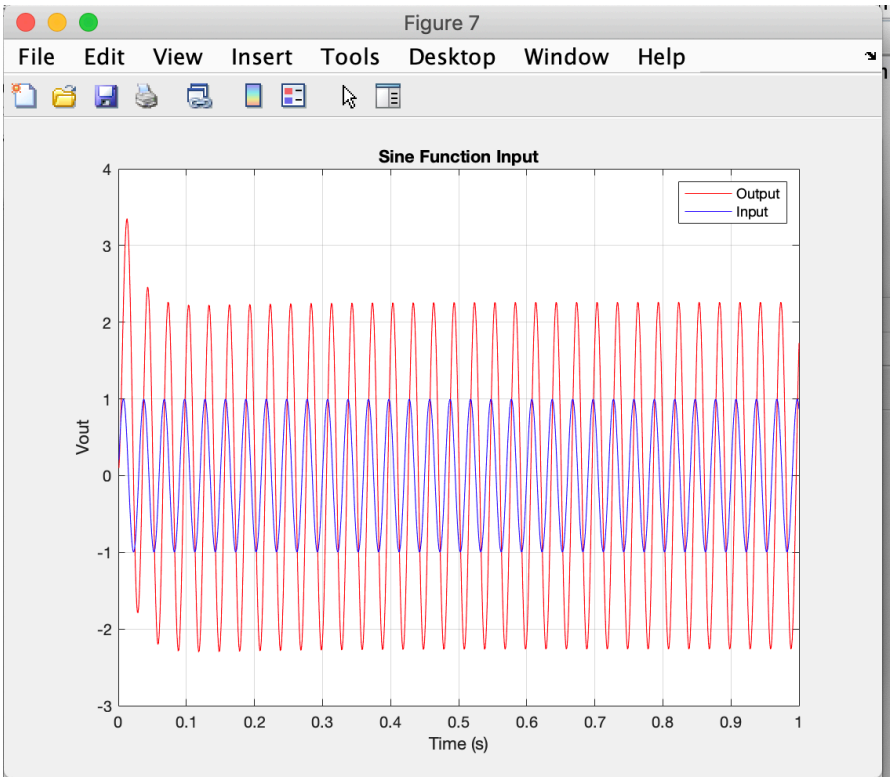

Figure 7: Sine function from part 2d

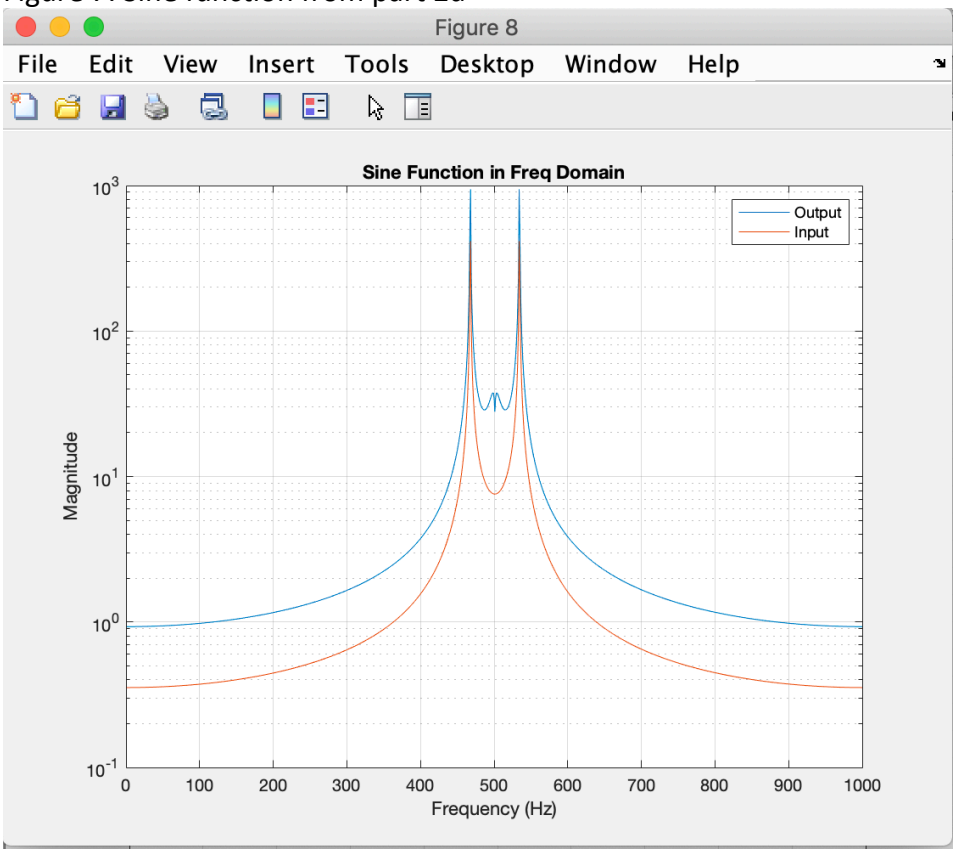

Figure 8: Sine function at different frequencies

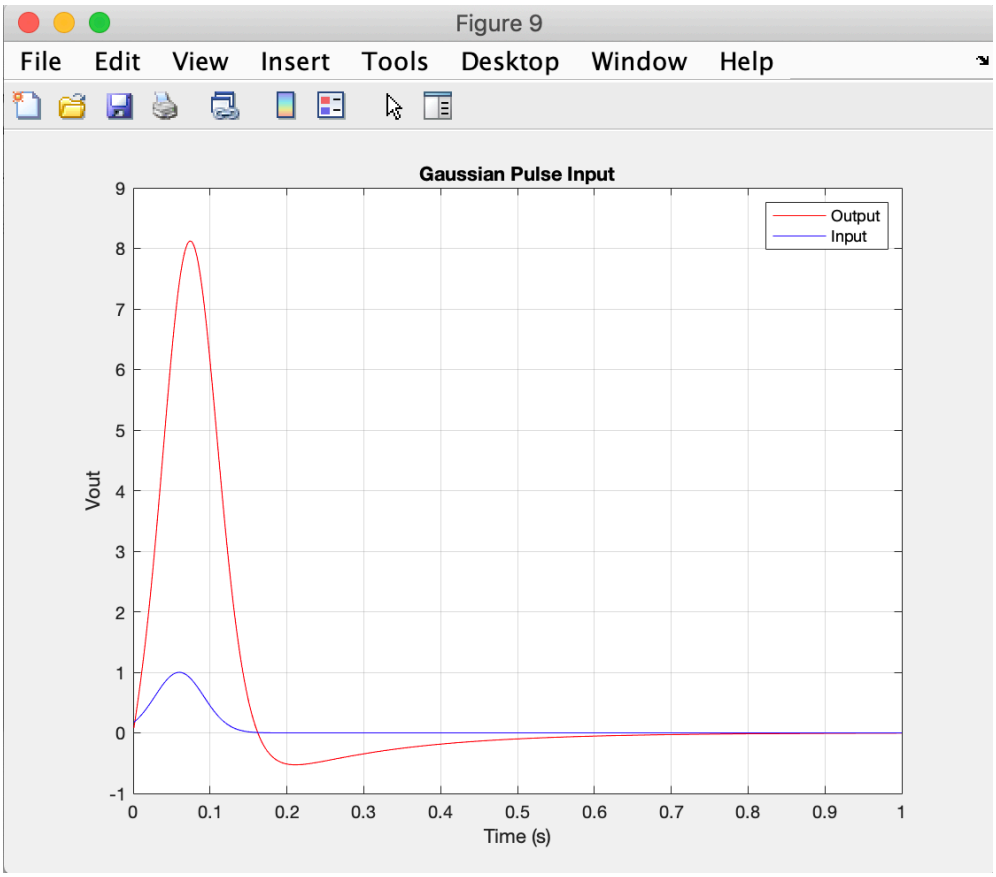

Figure 9: Part 2C Vin and Vout in time domain

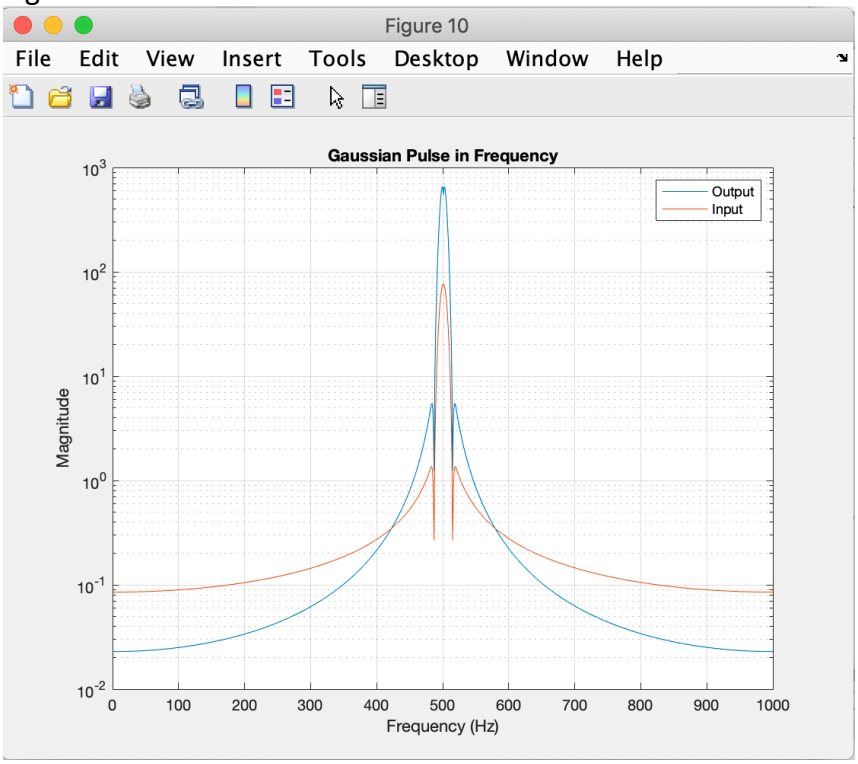

Figure 10: Fourier Transform of Frequency Response

Part 3

The following figures will show how noise affects the circuit simulations.

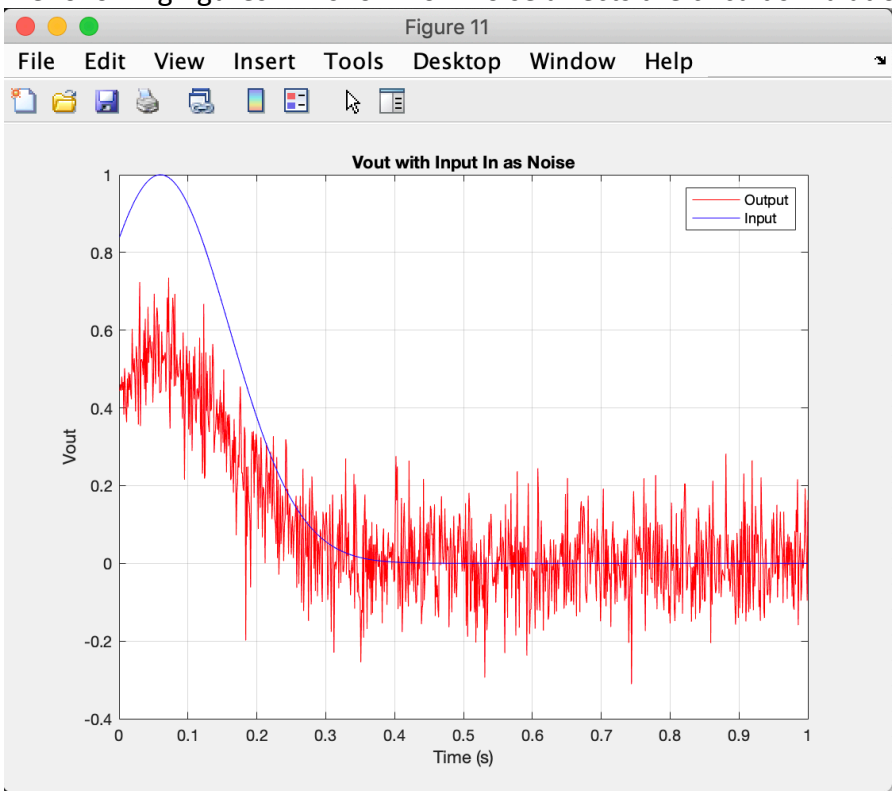

Figure 11: Vout and Vin with noise added to the circuit with time

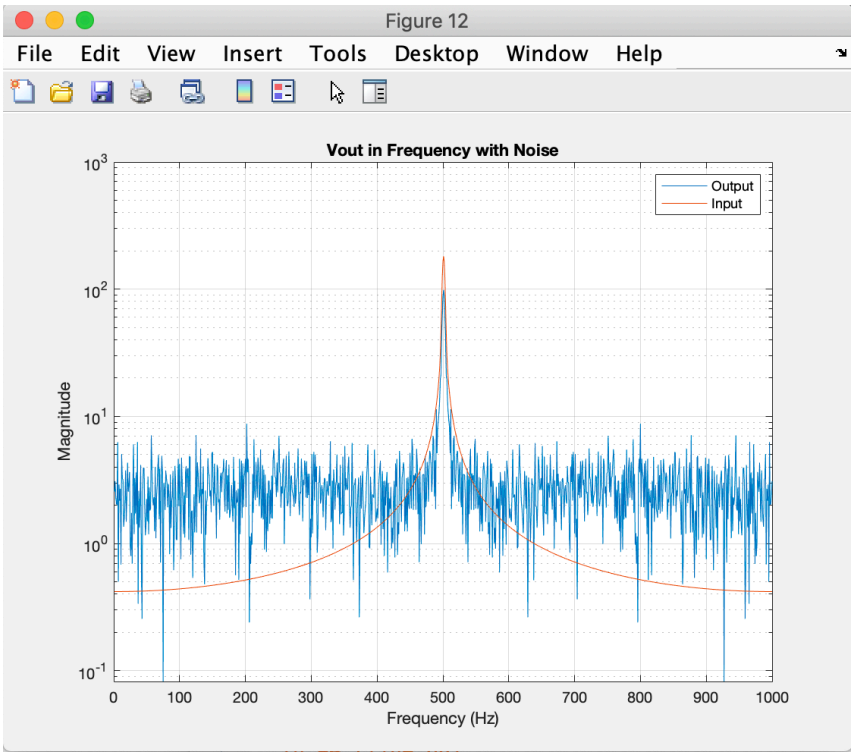

Figure 12: Vout and Vin with noise added to the circuit with frequency