

```

% ELEC 4700 Assignment 4 - Circuit Modeling
% David Bascelli
clear;
addpath code;

question1;
question2;
question3;
question4;

```

```

Question 1
Question 2
G matrix

```

```
G =
```

```
Columns 1 through 7
```

```

1.0000 -1.0000 0 0 0 0 0
-1.0000 1.5000 0 0 0 1.0000 0
0 0 0.1000 0 0 -1.0000 0
0 0 0 10.0000 -10.0000 0 1.0000
0 0 0 -10.0000 10.0010 0 0
0 1.0000 -1.0000 0 0 0 0
0 0 -10.0000 1.0000 0 0 0
1.0000 0 0 0 0 0 0

```

```
Column 8
```

```

1.0000
0
0
0
0
0
0
0
0

```

```
C matrix
```

```
C =
```

```
Columns 1 through 7
```

```

0.2500 -0.2500 0 0 0 0 0
-0.2500 0.2500 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 -0.2000 0
0 0 0 0 0 0 0
0 0 0 0 0 0 0

```

```
Column 8
```

0
0
0
0
0
0
0
0
0

Step Function
Sine wave
Gaussian Pulse
Question 3
G matrix

G =

Columns 1 through 7

1.0000	-1.0000	0	0	0	0	0
-1.0000	1.5000	0	0	0	1.0000	0
0	0	0.1000	0	0	-1.0000	0
0	0	0	10.0000	-10.0000	0	1.0000
0	0	0	-10.0000	10.0010	0	0
0	1.0000	-1.0000	0	0	0	0
0	0	-10.0000	1.0000	0	0	0
1.0000	0	0	0	0	0	0

Column 8

1.0000
0
0
0
0
0
0
0
0
0

C matrix

C =

Columns 1 through 7

0.2500	-0.2500	0	0	0	0	0
-0.2500	0.2500	0	0	0	0	0
0	0	0.0000	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	-0.2000	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

Column 8

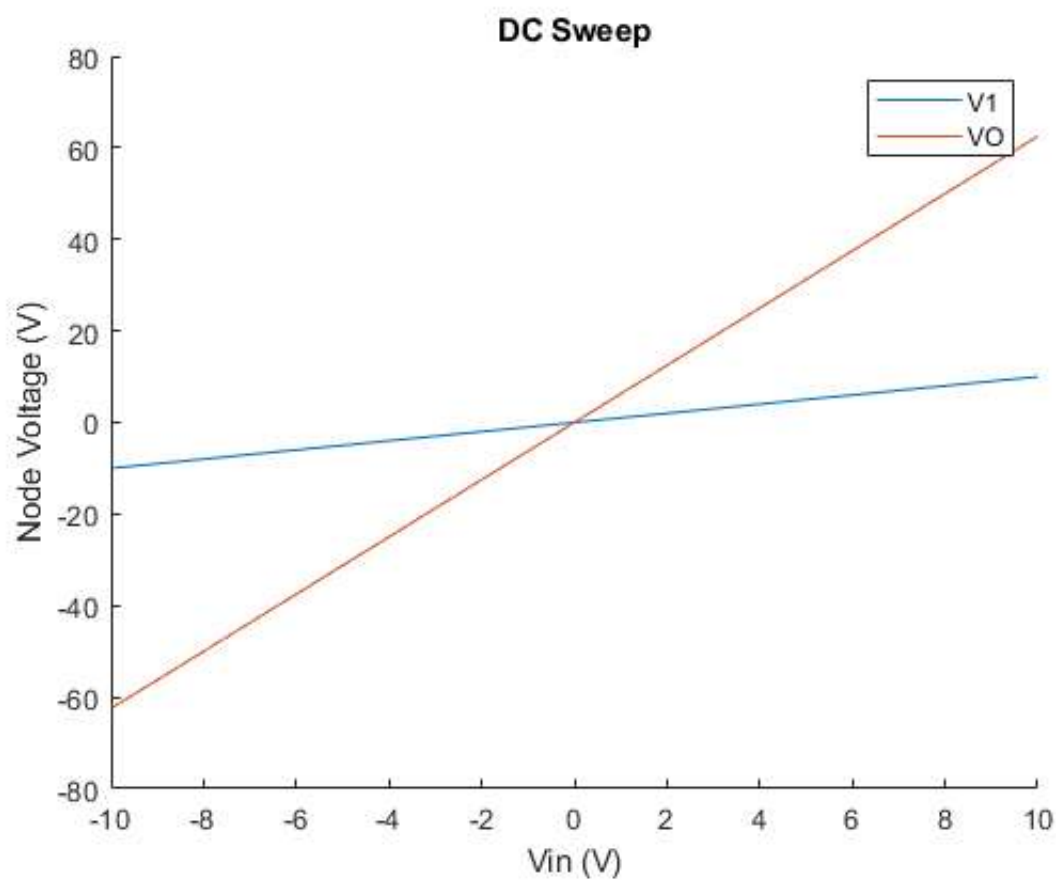
0
0
0
0
0
0
0
0
0

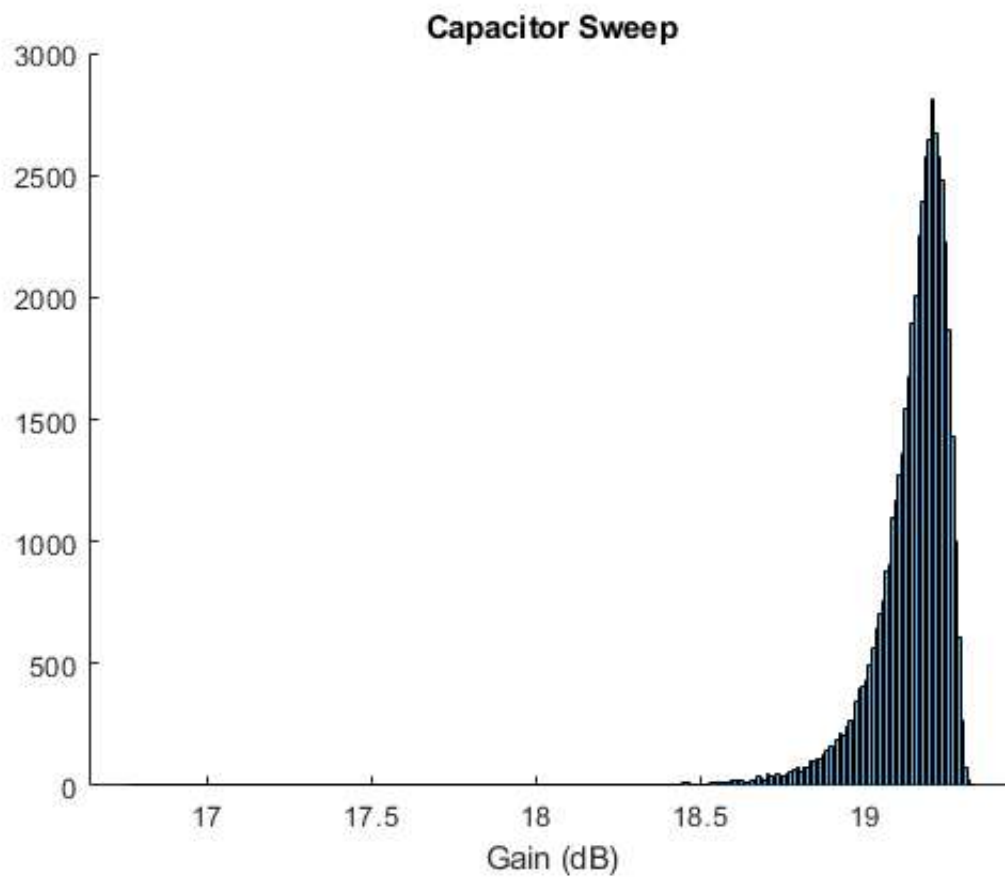
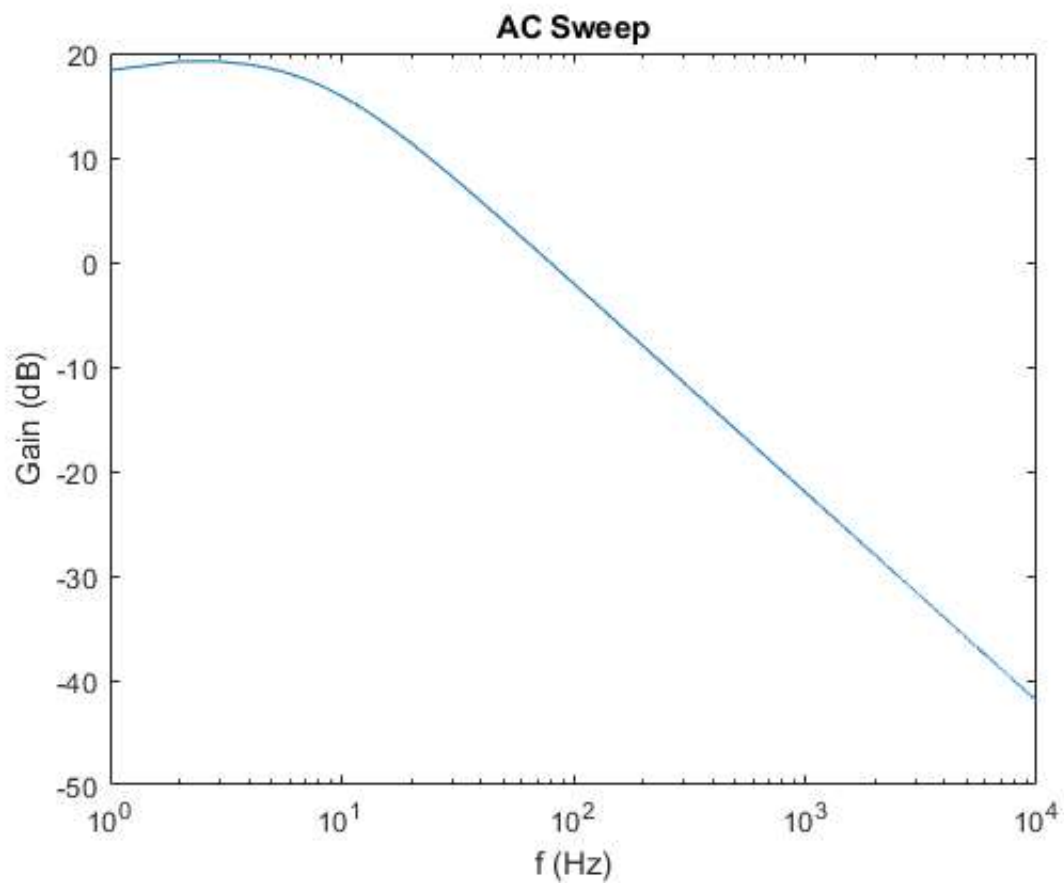
Varying the Noise Bandwidth

Vary Simulation Step Size

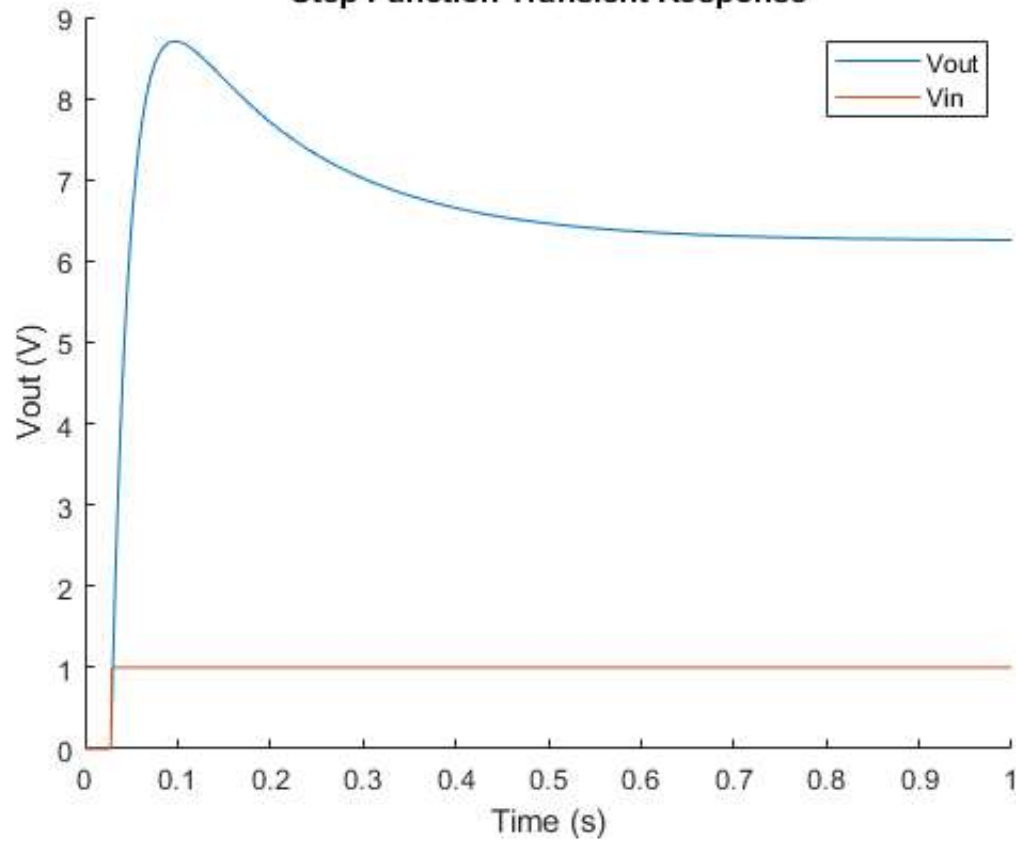
Question 4

a) You would need to add another term in the matrix equation to represent the non-linearity. The solution would then be iterative, for the time domain simulation, each step would have to be iteratively solved.

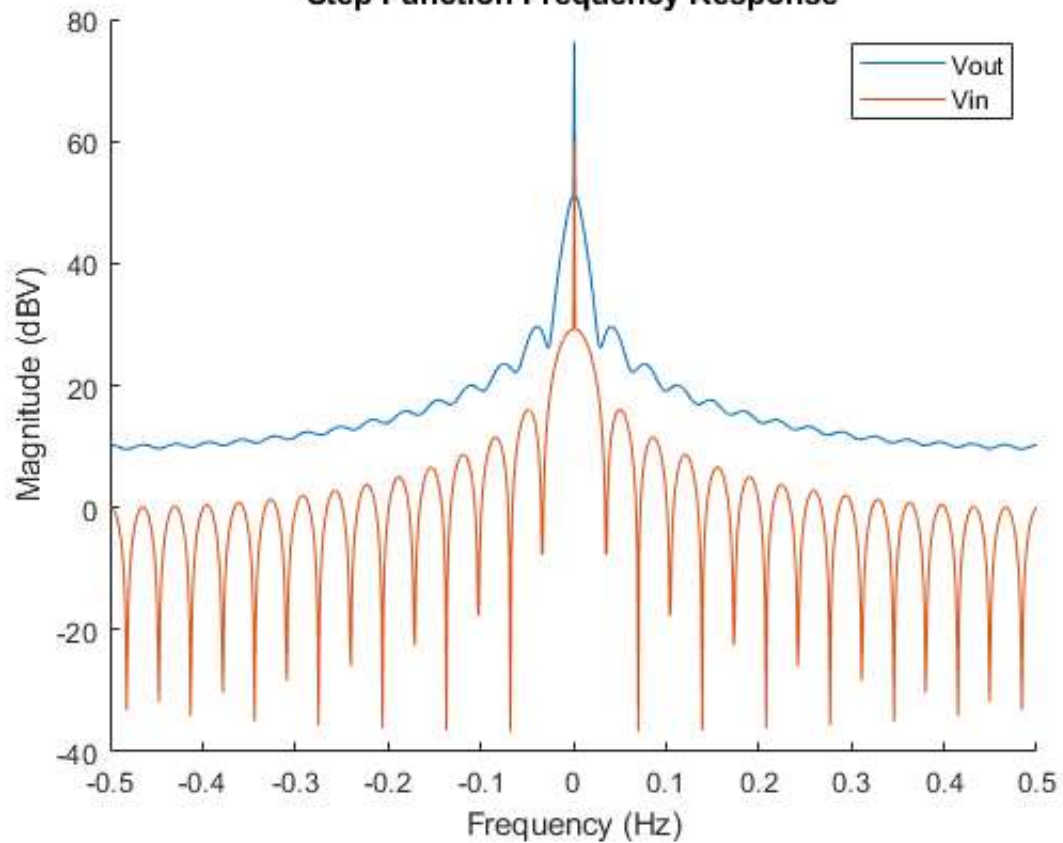




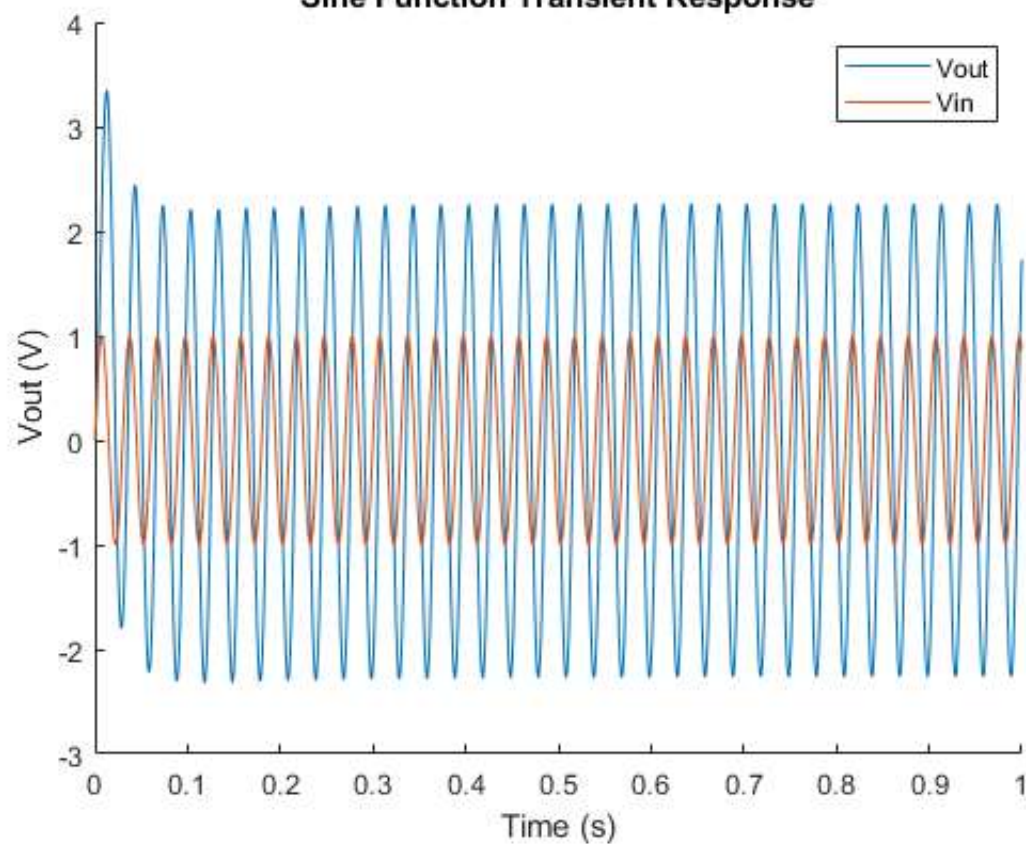
Step Function Transient Response



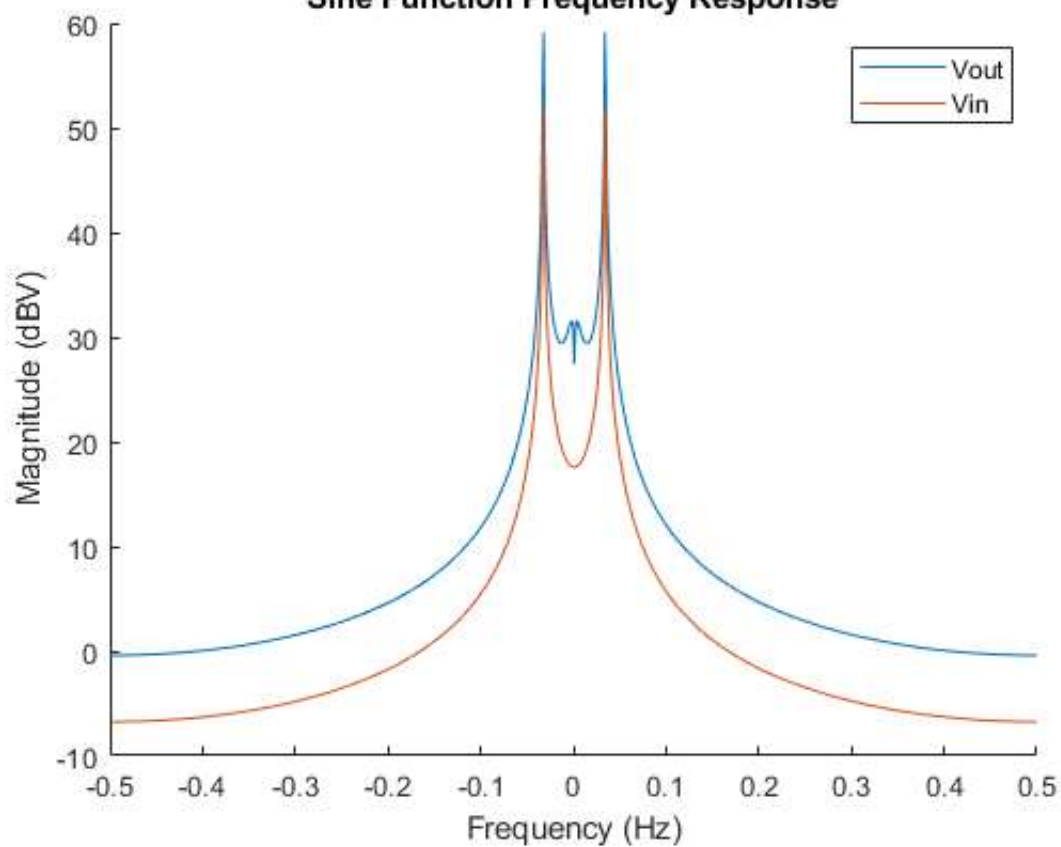
Step Function Frequency Response



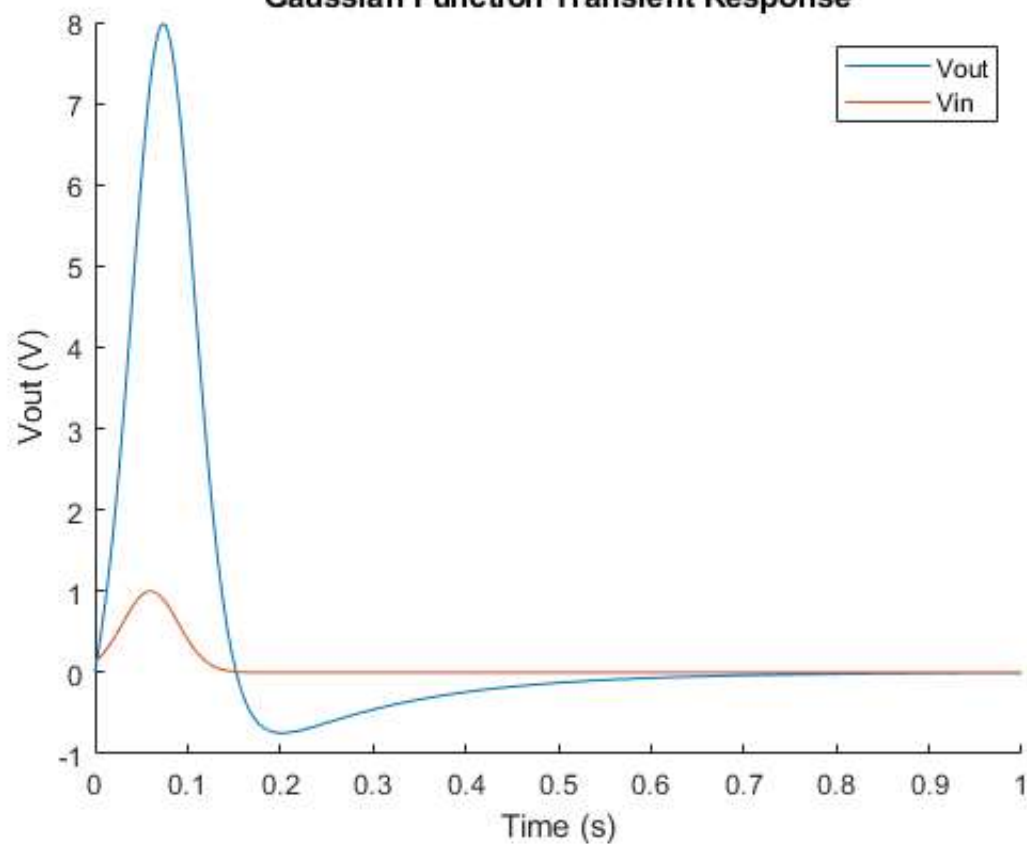
Sine Function Transient Response



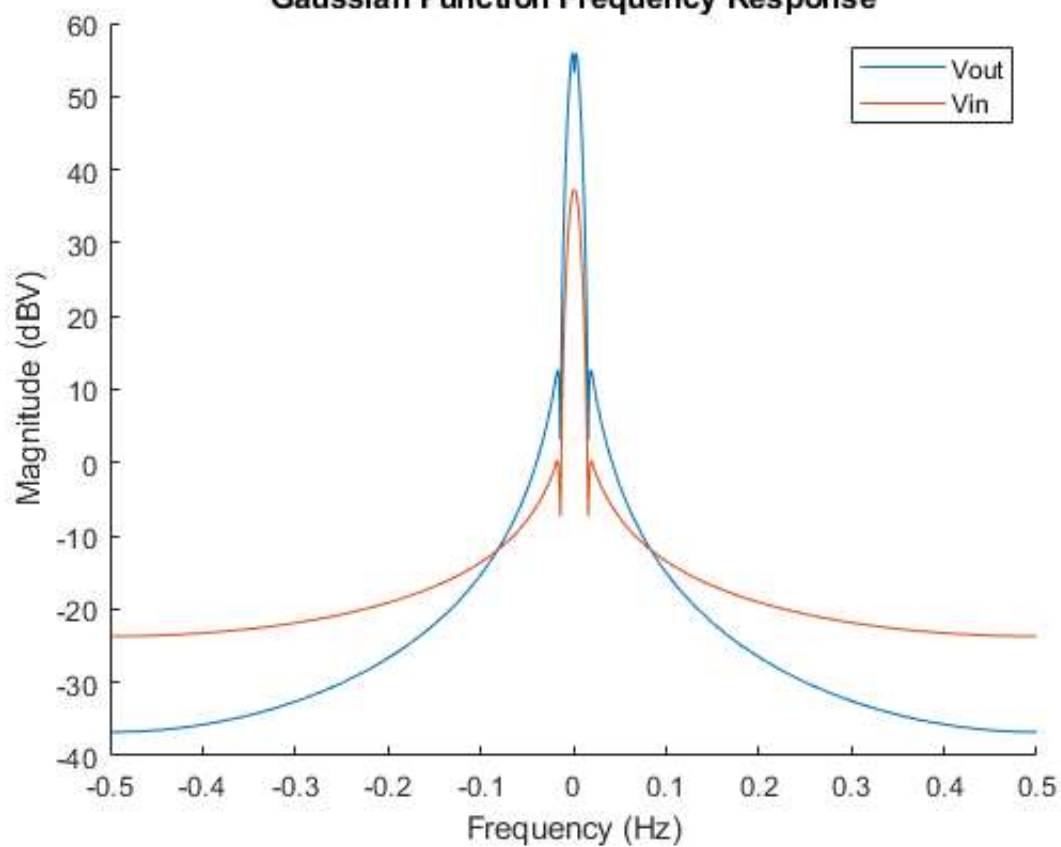
Sine Function Frequency Response



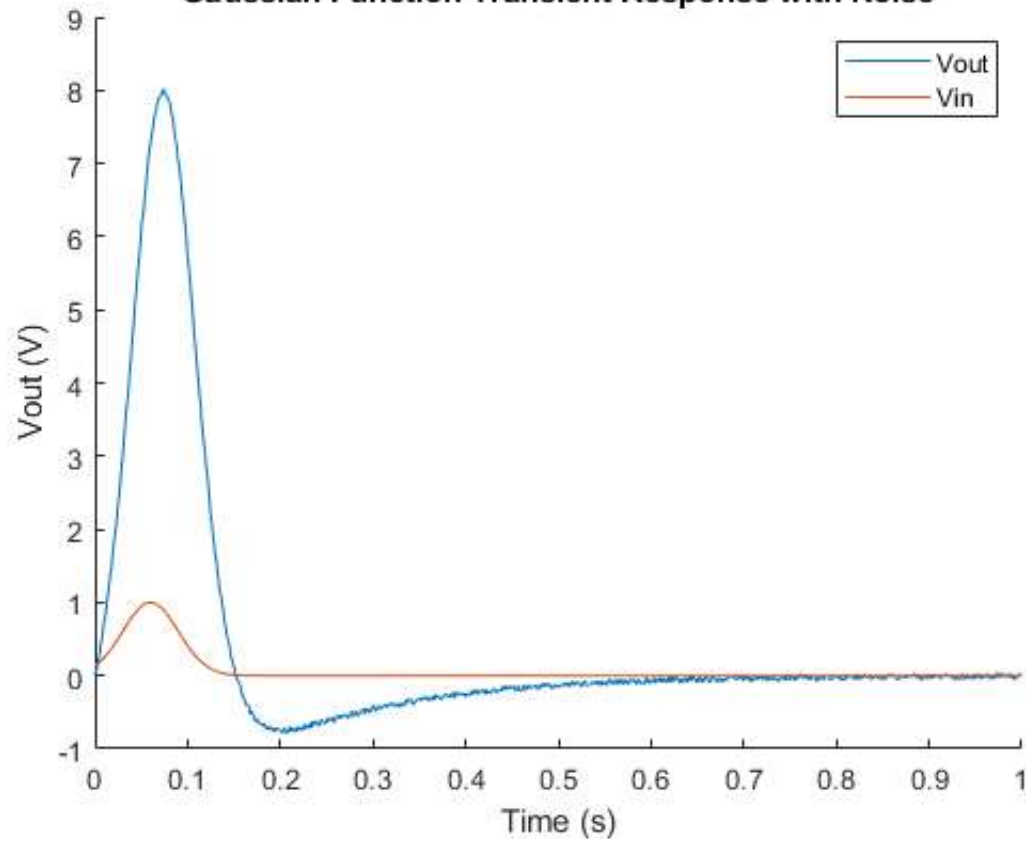
Gaussian Function Transient Response



Gaussian Function Frequency Response



Gaussian Function Transient Response with Noise



Gaussian Function Frequency Response with Noise

