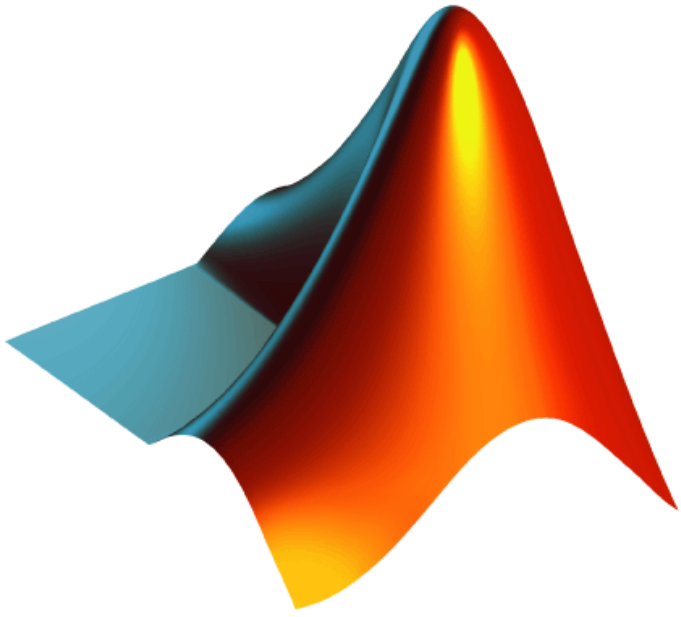
Alexandria University
Faculty of Engineering
Electrical Department - Third Year
Communications and Electronics

Signals and Systems Lab Project



Supervised by

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Team Number (36)

Team Members

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Introduction

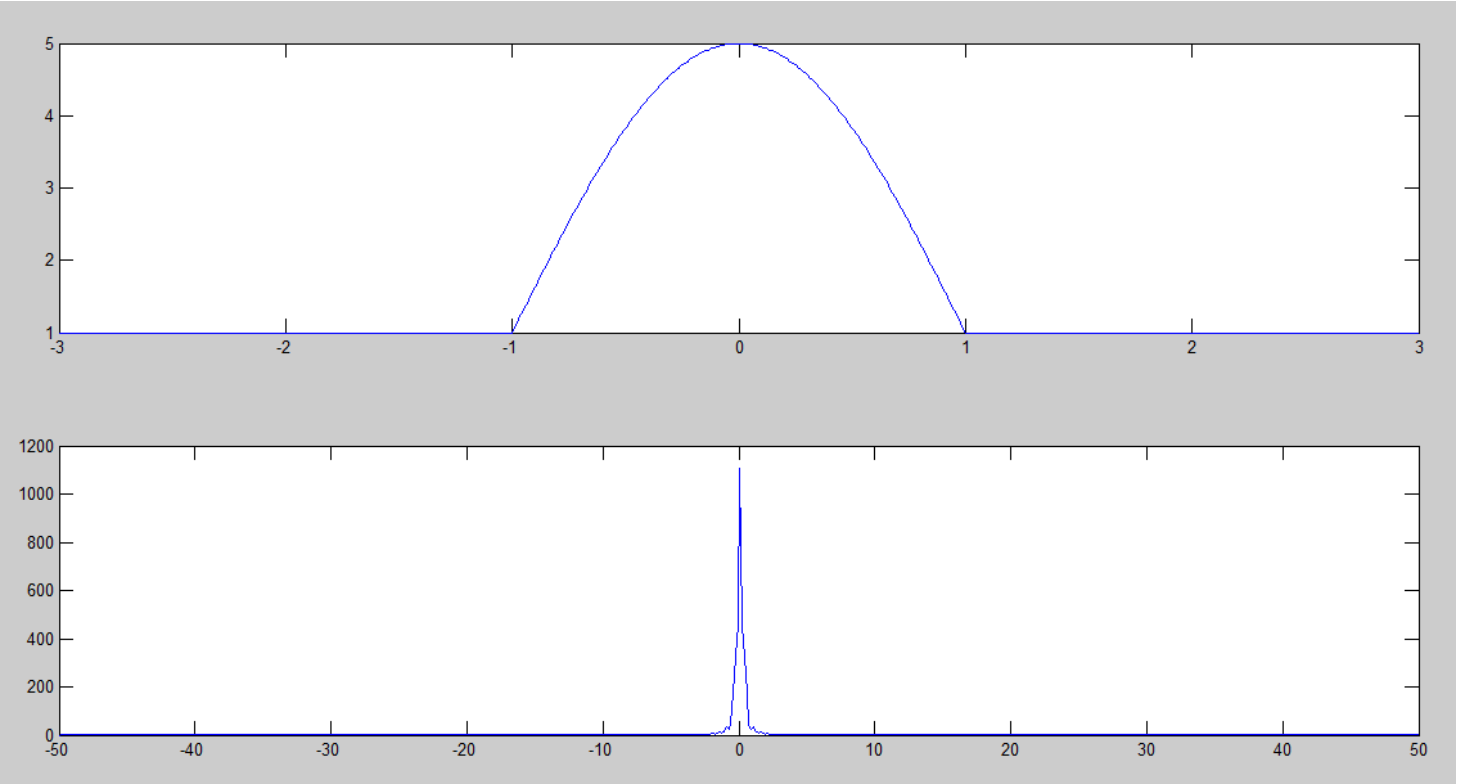
- Our project consists of 6 Matlab files; the 4 experiments as individual functions and one function for the plotting and one main function to call and use all the others.
- Our project is colored (using **cprintf** function; you will find an .m file of it attached, please download it to be able to run the program) user friendly with the privilege of checking on your input every time you enter it.
- To run the whole project all what you have to do is run "main.m" and follow the user interface.
- First you have to enter the sampling frequency of the whole experiments.

File Index

1. **cprintf.m:** for the colors of the text.
2. **main.m:** The main function that drives the project and calls all the functions.
3. **function_generator.m:** Experiment 1.
4. **LTI_ImpulseResponse.m:** Experiment 2.
5. **LTI_DE.m:** Experiment 3.
6. **sound_wav.m:** Experiment 4.
7. **plot_function.m:** for any plot in time and frequency domain

Experiment (1) - function_generator

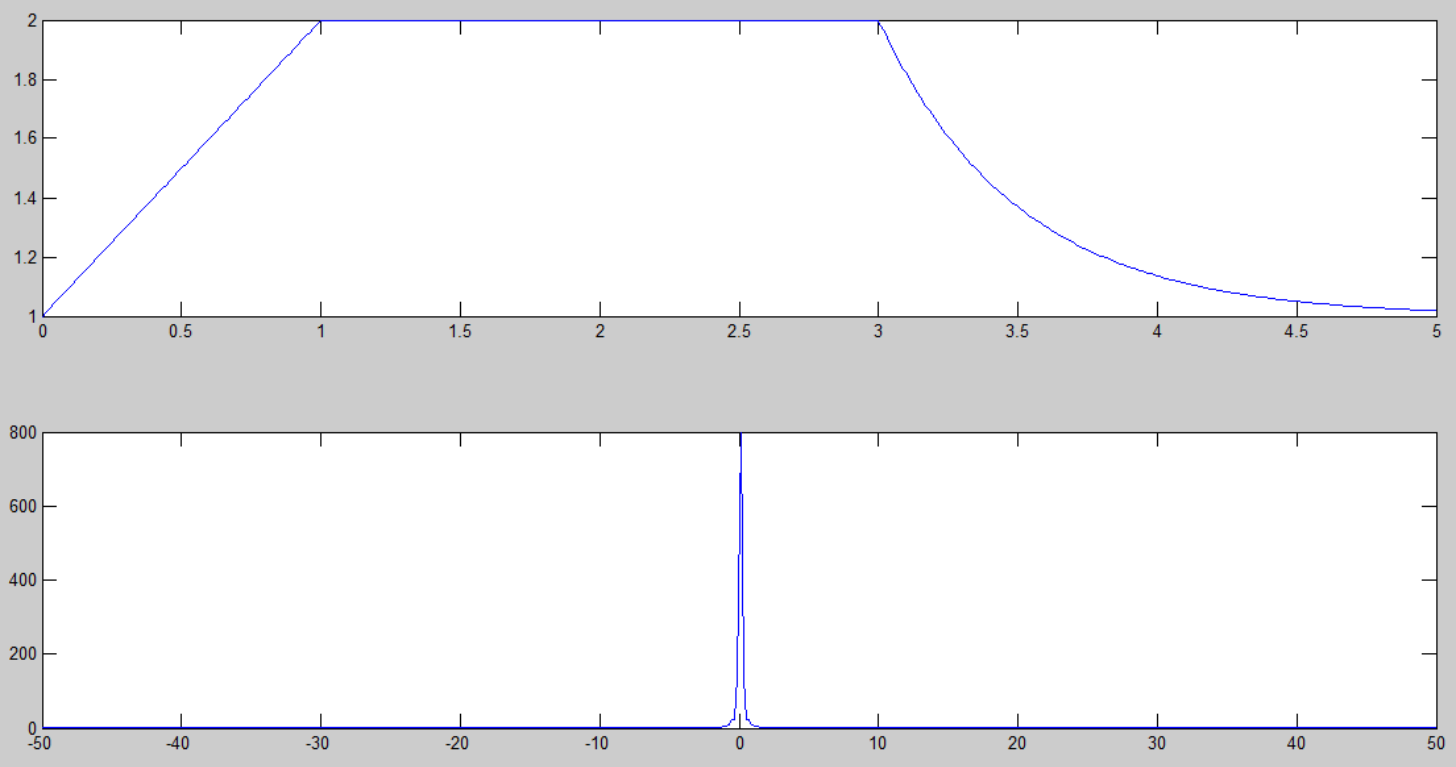
- **The generated signal:**



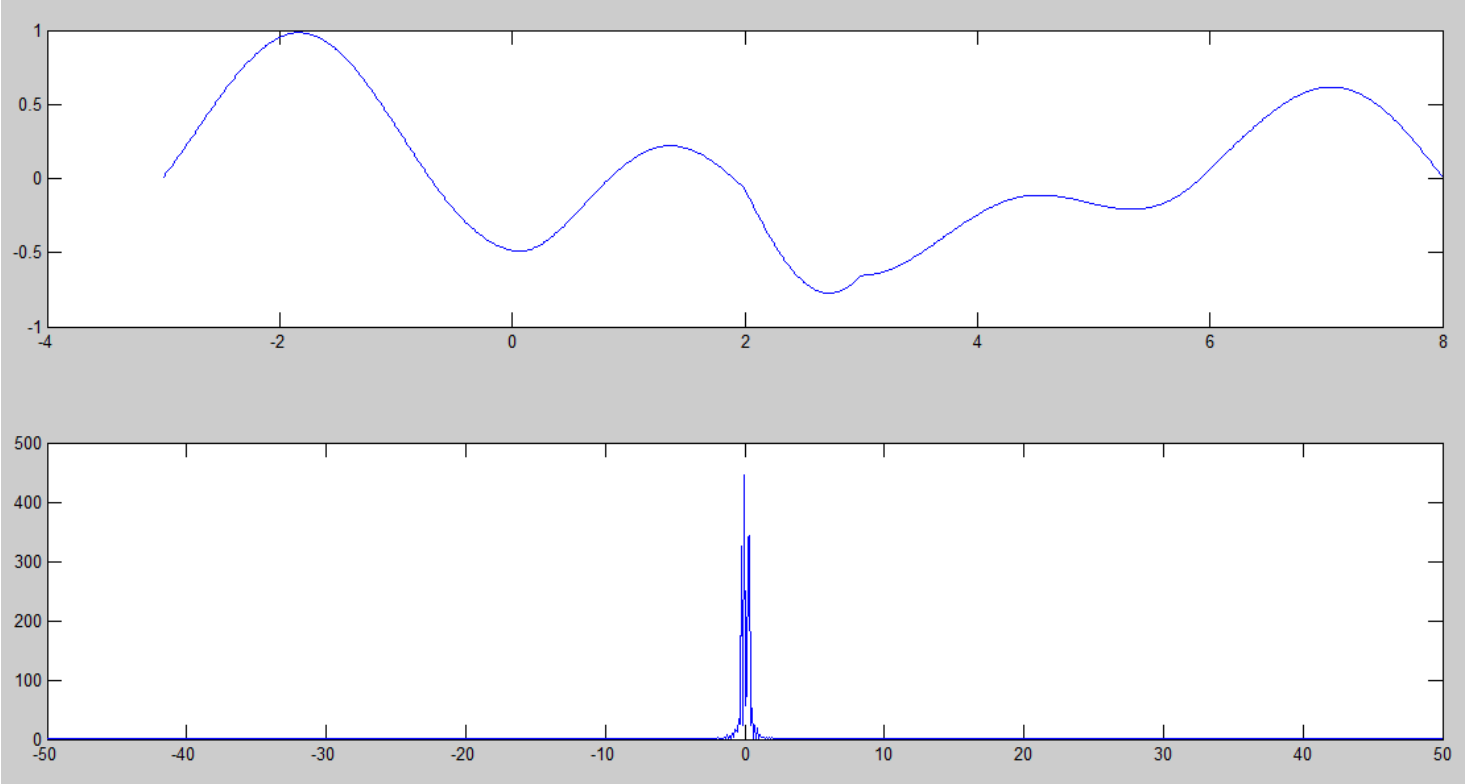
- **Note:** This is the test signal in the file in frequency domain and time domain.

Experiment (2) - LTI_ImpulseResponse

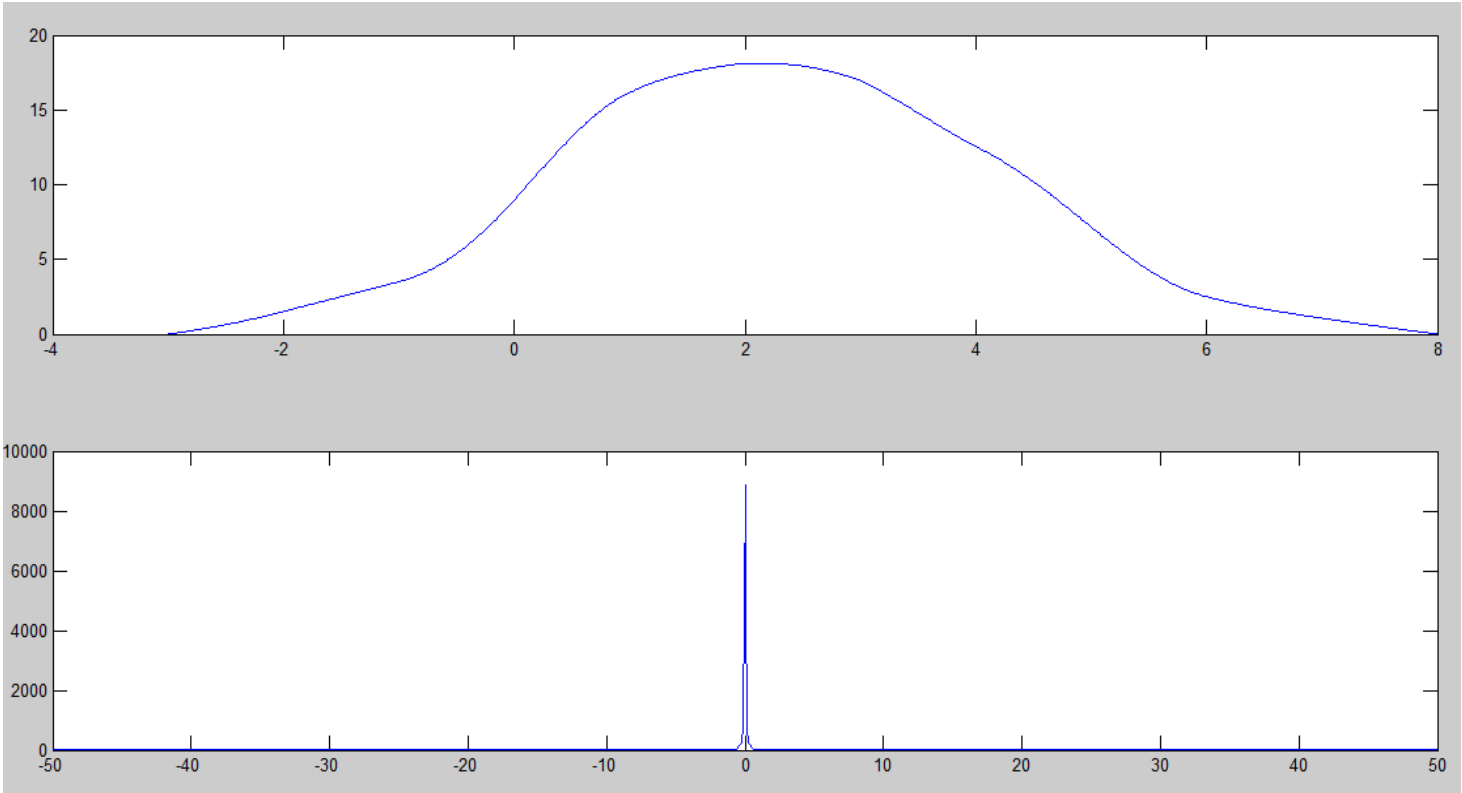
- **Note:** You will have to generate a signal as an impulse response.
- **The impulse response in time domain and frequency domain:**



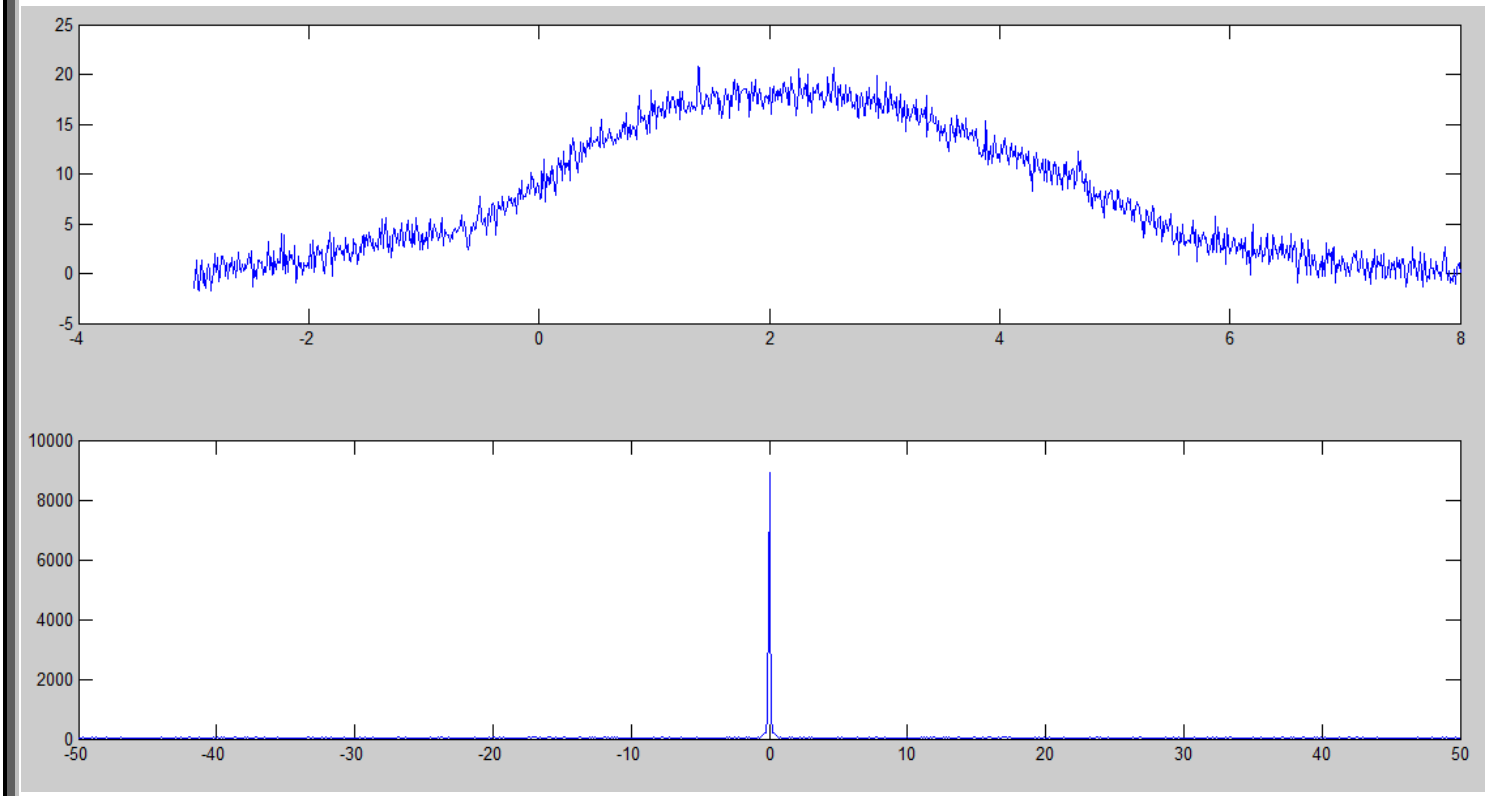
- **The frequency response of the impulse response as in the lectures.**



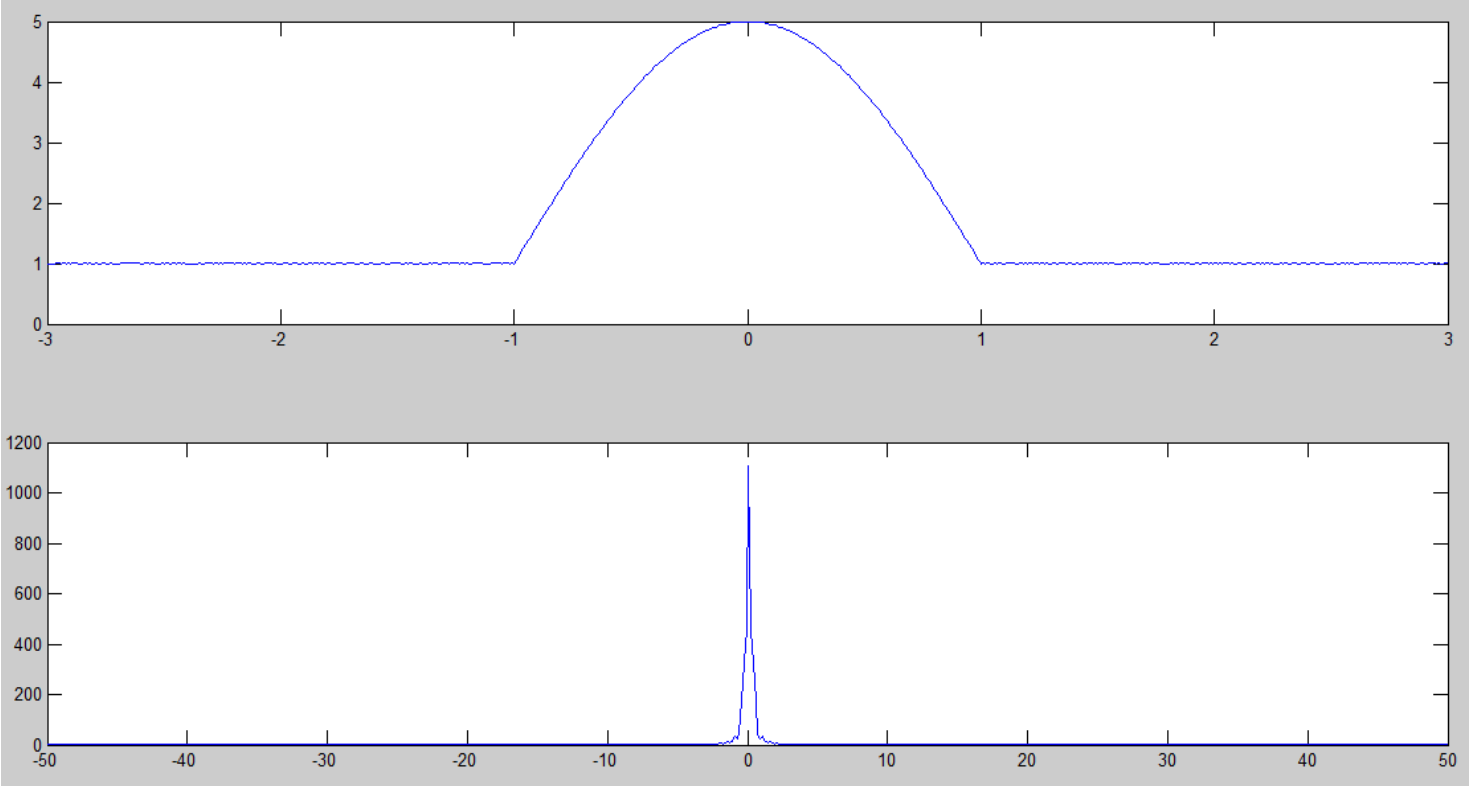
- **The output of the system:**



- **The noisy output:**

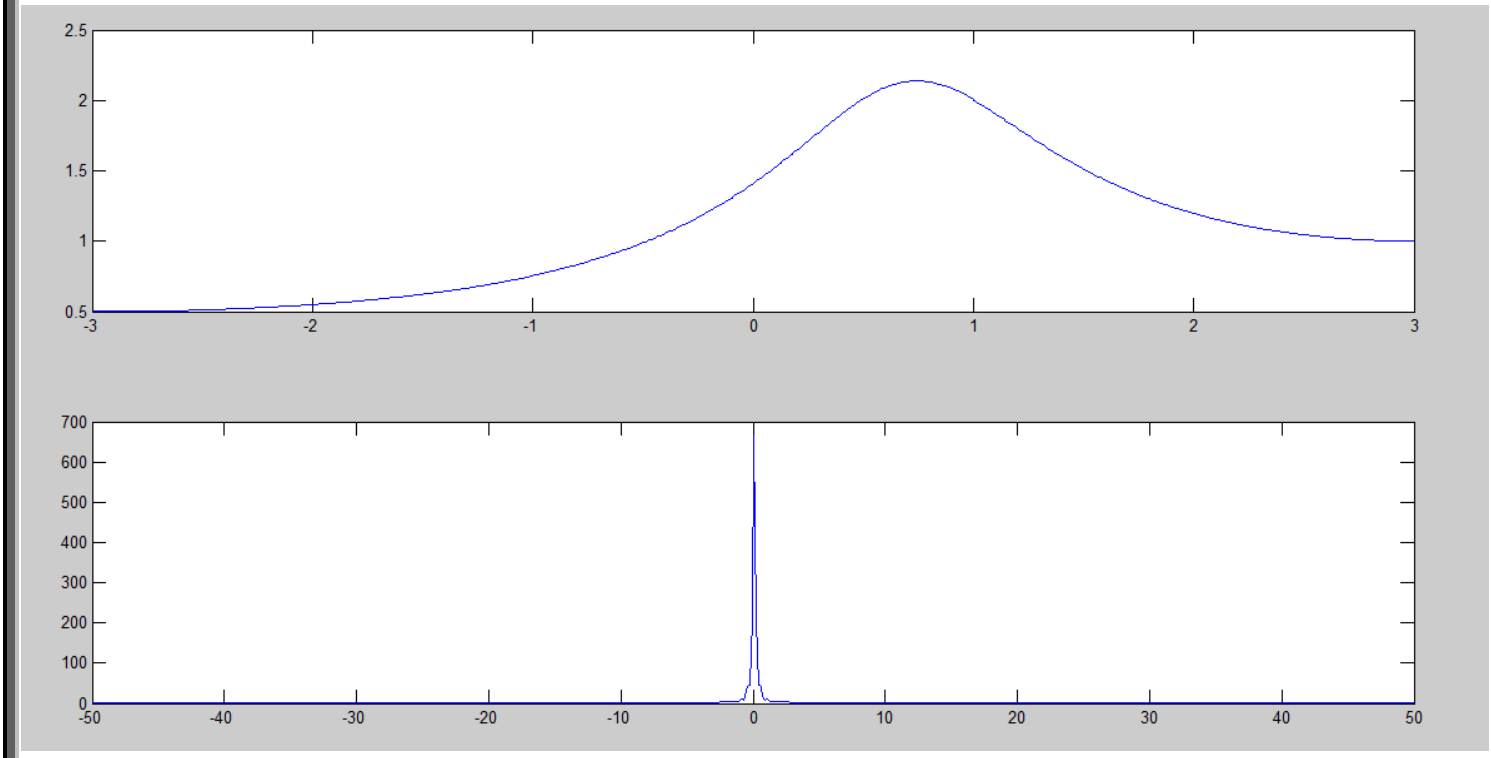


- **The deconvoluted signal:**

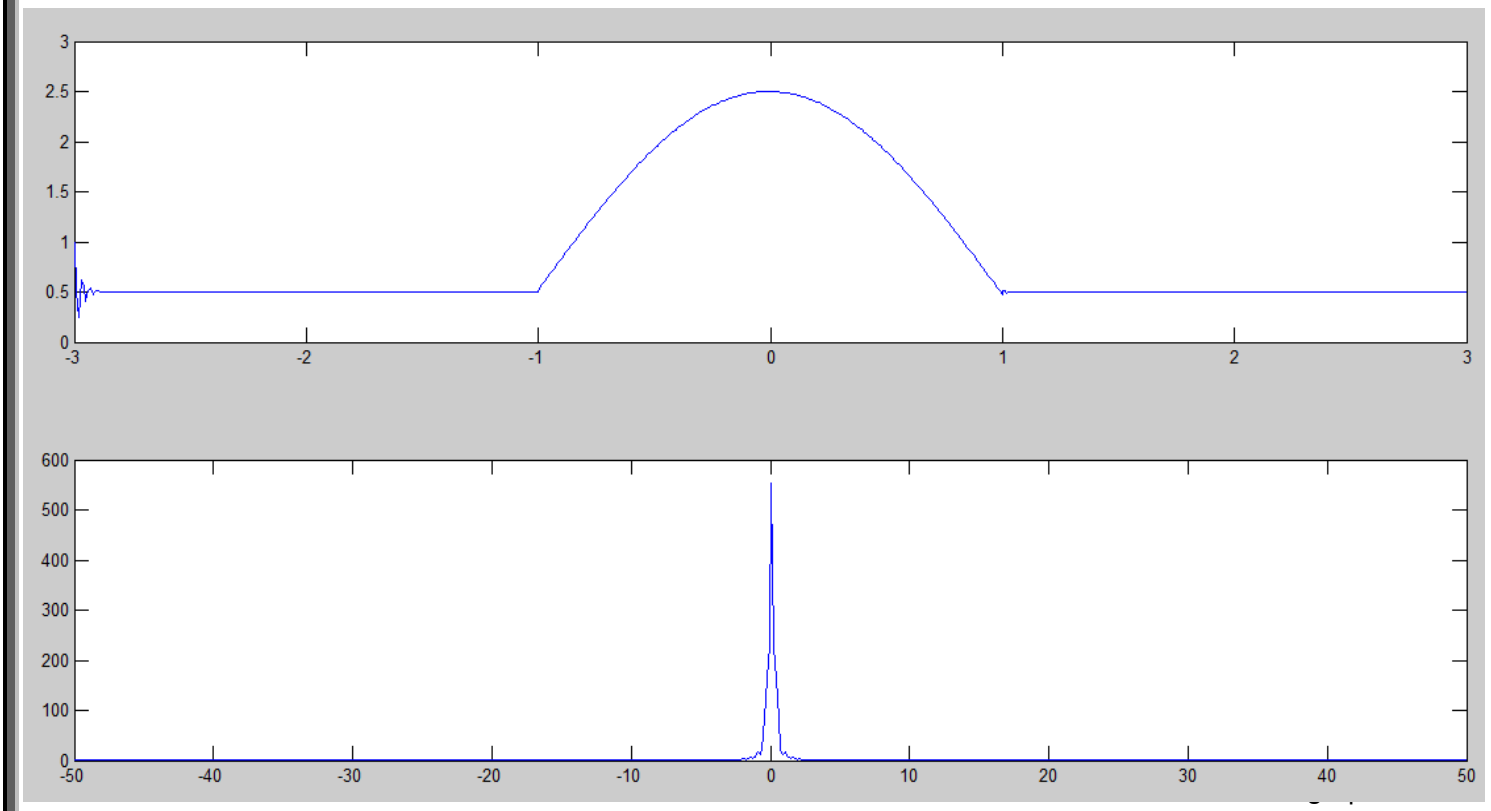


Experiment (3) - LTI_DE

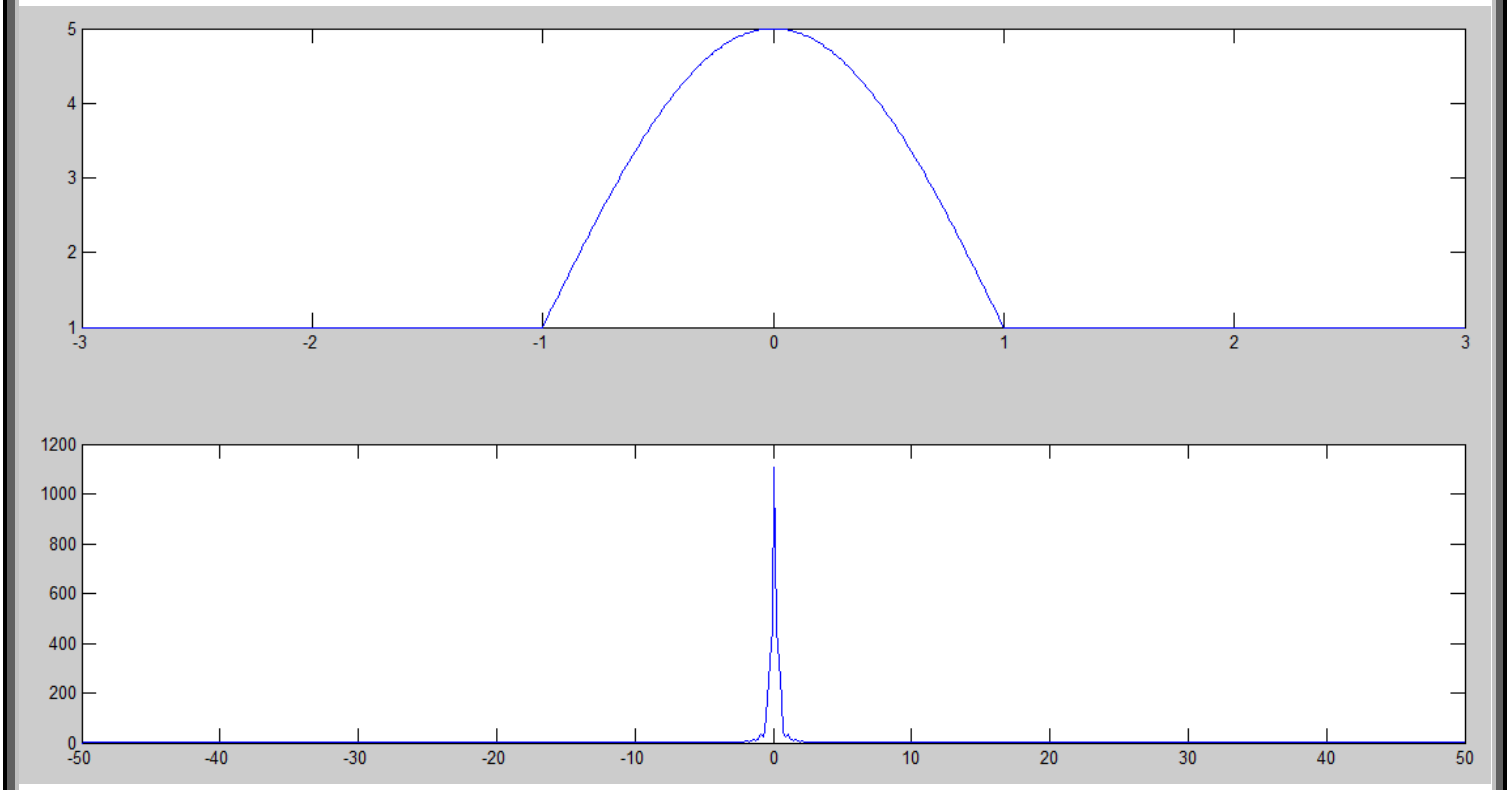
- **Note:** You will have to generate a signal as an impulse response.
- **The frequency response of the given difference equation system:**



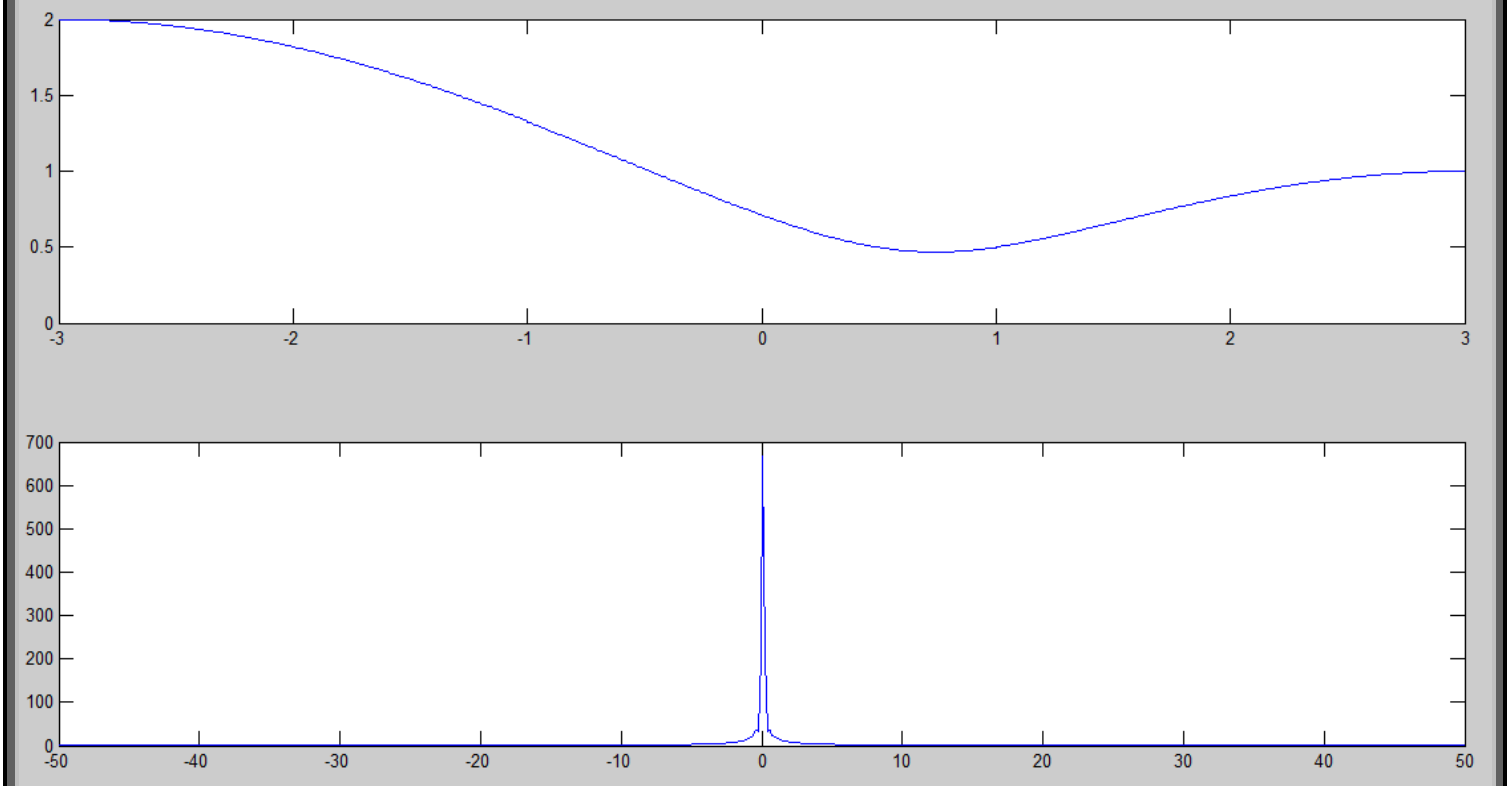
- **The output of the difference equation system:**



- **The returned signal of the inverse DE system:**

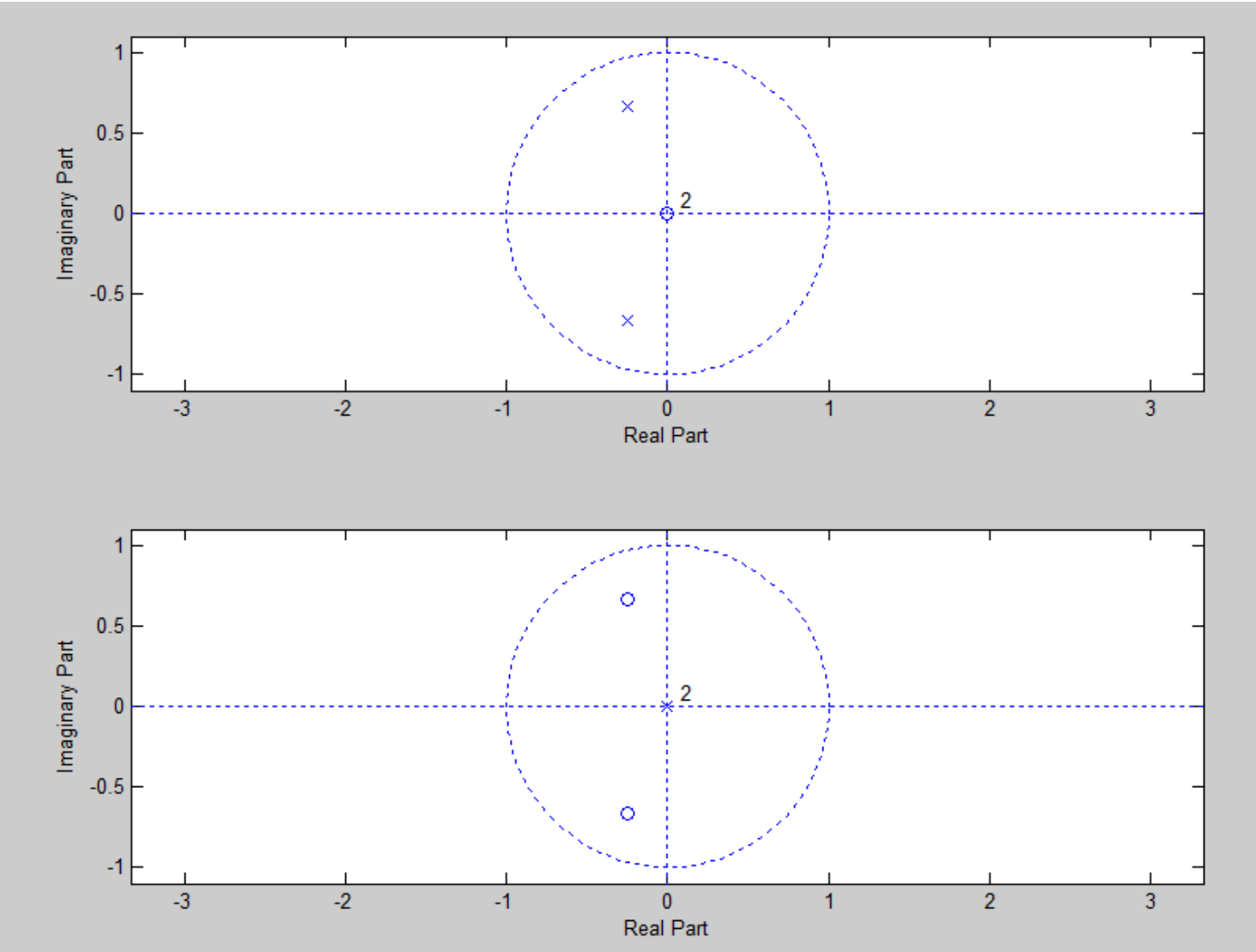


- **The frequency response of the inverse DE given system:**



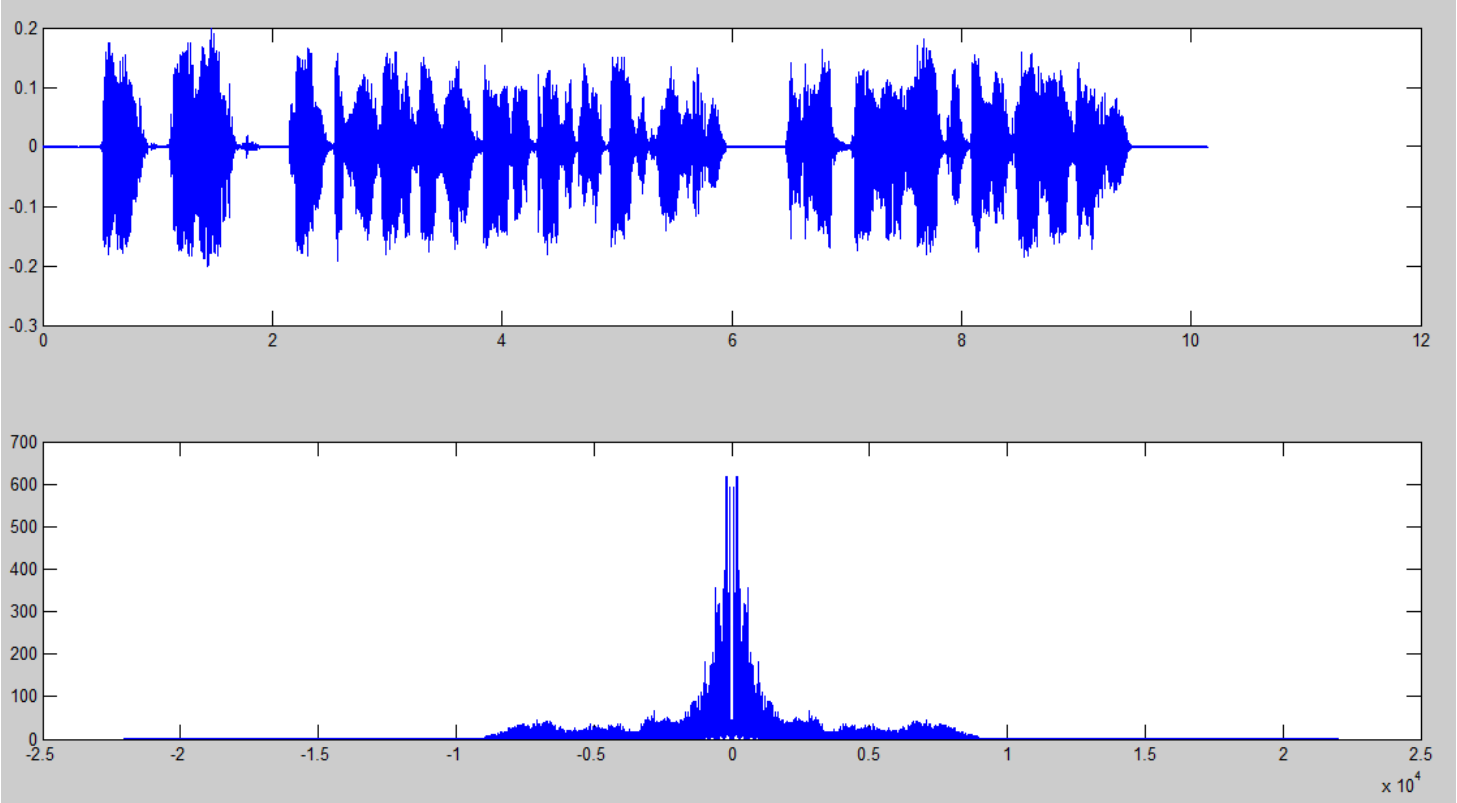
- **Bonus of stability:**

  Both systems are stable as the poles are inside the circle.



Experiment (4) - sound_wav

- **The input sound in time domain and frequency domain:**



- After convoluting with the impulse response, the output sound is as the input but repeated 1 time, where the first time has the same amplitude of the original sound and the second time has half the amplitude.

- **Bonus:** Filtering at 4 KHz -High pass filter-