University of Washington
Department of Electrical Engineering
EE 235, Fall 2017

Report for Lab #2:
2Continuous-Time Signals and Transformations in Time

Report by:
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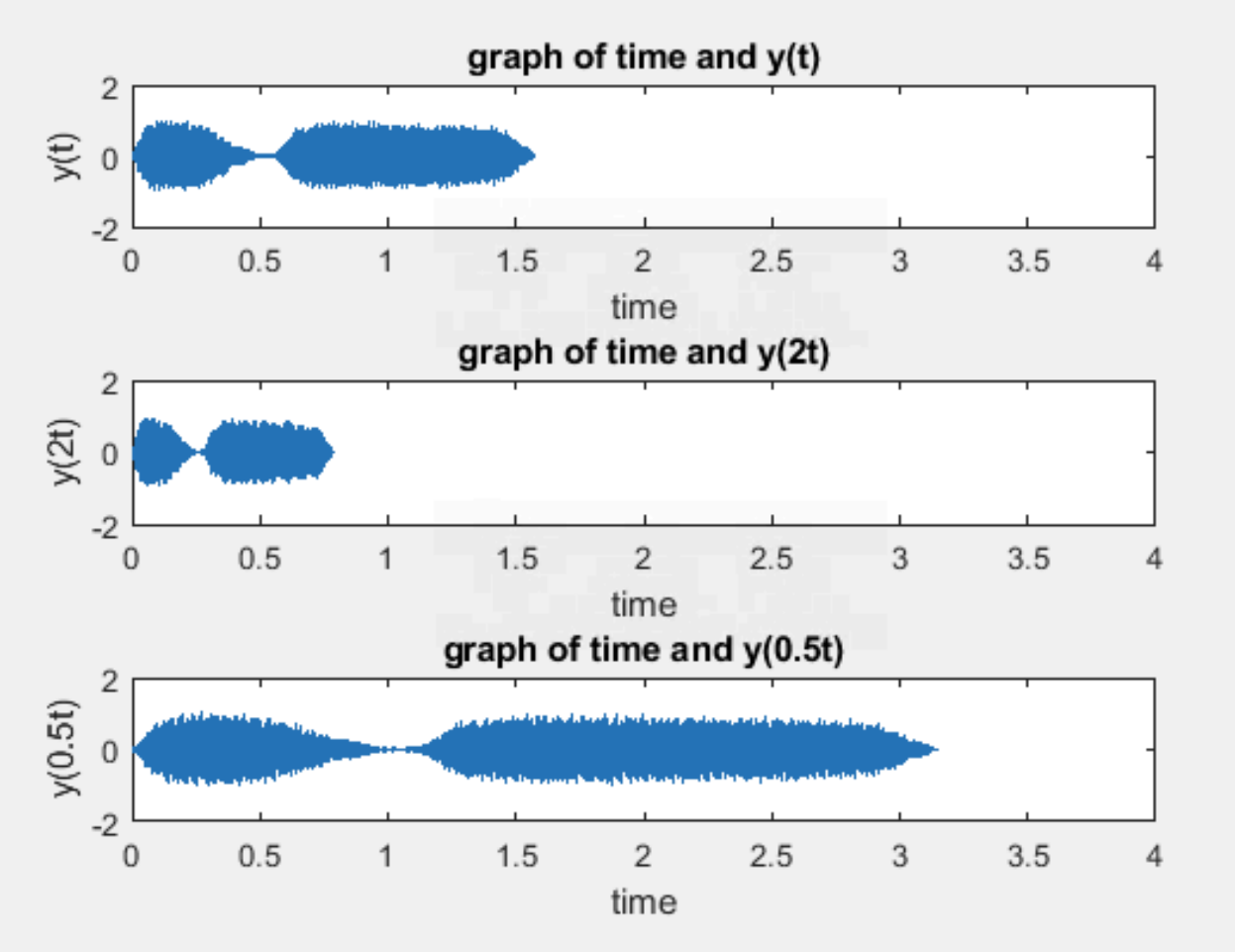
1 EXECUTIVE SUMMARY

This lab introduces us syntax for functions and time transformation of signals by using these functions. In the prelab, we derived a general algorithm for scaling and shifting a distorted signal back to its original form. In the lab, we manipulate a sample sound file by scaling it by two different constants and compare the result to the original signal. We then shifted the same signal by implementing a timeshift function. Finally, we apply scaling and shifting to a distorted audio file to recover the information. This lab also based on the scale and shift lectures.

2 EXERCISE #1: TIME SCALE OPERATION

In this exercise, we scale a sample sound signal by 2 and 0.5 by using a timescale function.

2.1 PLOTS



2.2 LAB REPORT QUESTIONS

Q: Suppose a student runs the figure command before every call to subplot. When you run your script Ex1.m again, what changes do you expect to see? How will the plots change?

There would be there plot windows, the first one has the plot on the top of the window, the second one in the middle, and the third one at the bottom. The graphs, limits, and labels won't change.

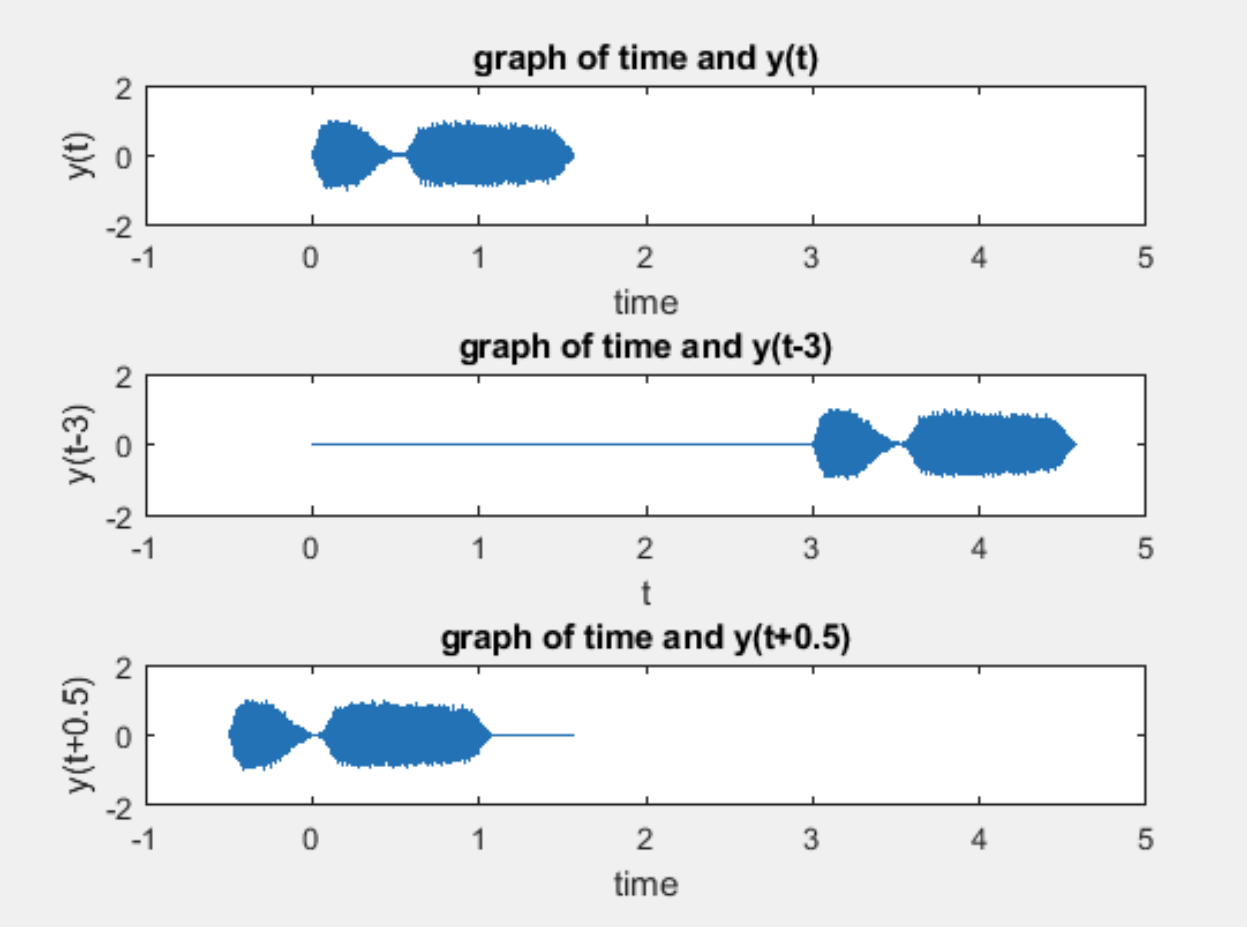
Q: Suppose that you do the time scaling simply by changing the time vector, t_y2b=2*t_y, and then you plot vector y using times t_y2brather than t_y. The plot would look very similar to the plot for y2. What would you have to change in the sound command in order to have the same sound as y2?

Frequency. We ould use Fs / 2 instead of Fs, because the timescale function also scales the frequency and in this case, by a factor 0.5.

3 EXERCISE #2: TIME SHIFT OPERATION

In this exercise, we shift a sample sound signal by 3 and -0.5 by implementing a timeshift function.

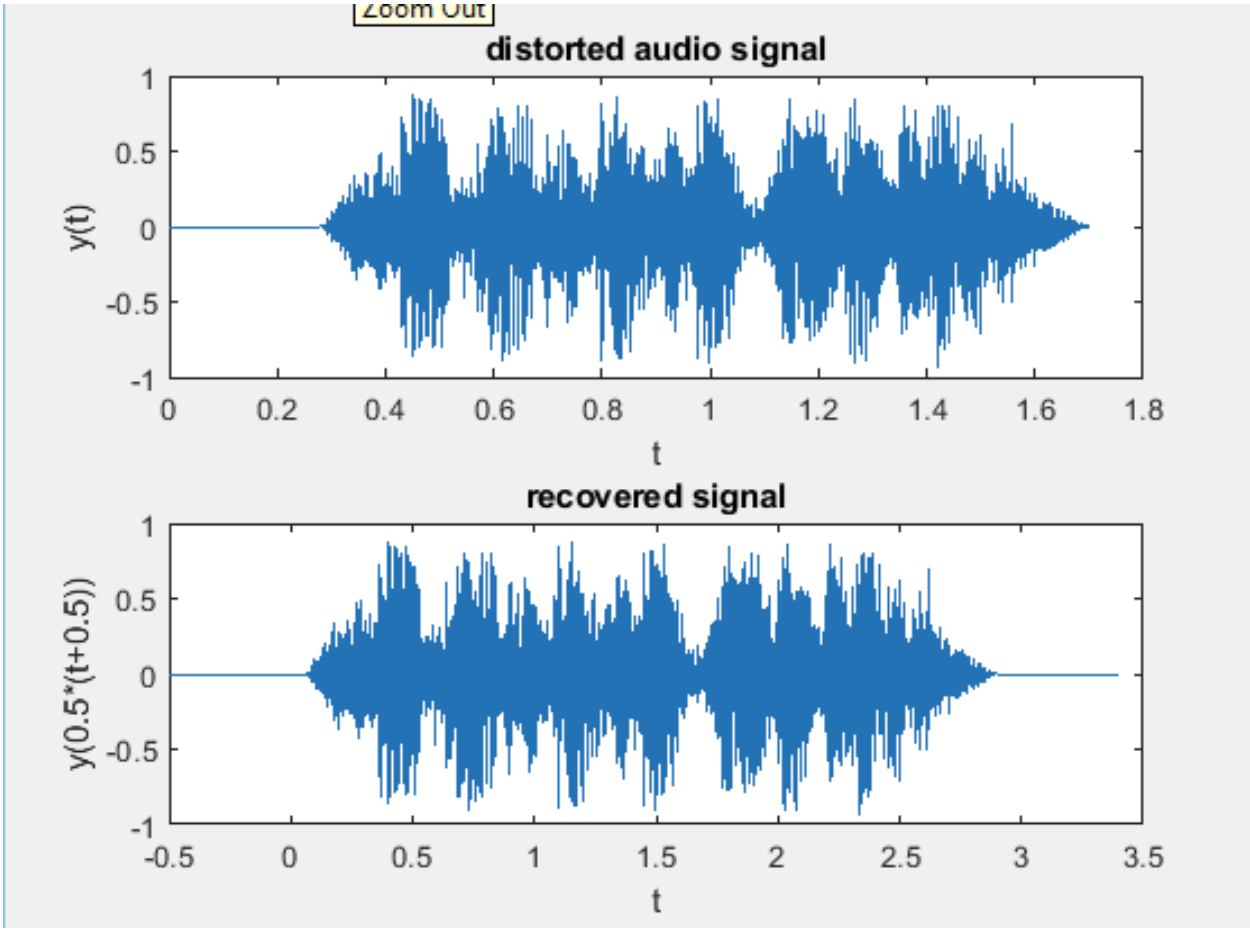
3.1 PLOTS



4 EXERCISE #3: RECOVERING POPULAR TV/MOVIE AUDIO FILE

We recover a distorted signal by applying timescale and timeshift properties.

4.1 PLOTS



4.2 LAB REPORT QUESTIONS

What is the quote in the sound file? If youare having trouble identifyingsome ofthe words, feel free to ask your TA for help. Can you identify which popular TV show or movie that quote came from?

"great power comes great responsibility" – Spiderman, 2002

Suppose a student accidentally flips the order of function calls in step (f) when performing the time transformations, and calls time shift first before calling timescale. Clearly, the output of the sequence of transformations will no longer be x(t). What will the output be in terms of signal x?

y(t) = x(2t-0.5); x(t) = y(t/2 + 0.25) = y(0.5*(t+0.5)) (scaled by 0.5 then shifted by -0.5)

if shifted by -0.5 then scaled by 0.5, the result is y(0.5t+0.5) = x(t+0.5)