BLG354E
Homework-3

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- You should write all your code in Python language.
- For the mathematical questions, it is not necessary to use LaTeX etc. You can clearly write your answers on papers and scan them.
- Cheating is highly discouraged. If you are planning to use different libraries or functions, please ask me about it.

1 (50 pts) - DT Fourier Transform

Find the discrete time Fourier transforms of the following signals.

- $$x[n] = \begin{cases} 3^n & 0 \leq n \leq 5 \\ 0 & otherwise \end{cases}$$
- $$x[n] = \delta[5 - 3n] + \delta[5 + 3n]$$

2 (40 pts) - Inverse DTFT

Find the original signals for the following frequency domain representations.

- $$X(\Omega) = 3cos(3\Omega)$$
- $$X(\Omega) = 0.75e^{-j6\Omega}\frac{sin(3.5\Omega)}{sin(0.5\Omega)} + e^{-j12\Omega}\frac{1}{1 - 0.5e^{-j\Omega}}$$

3 (10 pts) - Machine Learning

For this homework, you will use machine learning to distinguish voices of prestigious Turkish academics & researchers. The audio files for this challenge include Aziz Sancar, Biykem Bozkurt, Cahit Arf, Canan Dagdeviren and Koray Kavukcuoglu. You can find the train files under this link [1]. Each audio file has the same length of nearly 5 seconds.

You should upload your predictions for the test data to the following Kaggle challenge[2] to get a place in the leaderboard. If the values are not reproducible by the code in your HW files, your rank will be eliminated.

Hint: Examine scikit-learn and librosa libraries.

[1] https://www.dropbox.com/sh/qwdd7u2g8ofng1e/AACK0BE_7FlEeiLZFGjlZ49aa?dl=0
[2] https://www.kaggle.com/t/d6233f6dafa842f9b6c8d32267abaea5