Math 77A Final Project (Due March 18)

Instructions: Your goal is to write a function in MATLAB that can take in a grayscale image and represent it as audio such that the spectrogram of the audio signal looks approximately like the input image. This is intended to be more of an open ended research project. There is more than one way to go about it. You can for instance control the length of your signal as well as the window and resolution parameters of the spectrogram. In addition to writing the MATLAB code, also write a short summary of your method, being sure to address and explain the following:

- Summarize the problem you're solving.
- Explain the main idea behind your strategy.
- Say what assumptions you're making.
- Provide a detailed explanation of your algorithm.
- Show a visual comparison of an input image and the output audio spectrogram. How do you evaluate the performance of your method?
- Discuss ideas for further research (or try some of them if you have time).
  - What are some alternative approaches?
  - Can you think of some possible applications?
  - How much control do you have over the sound of the audio signal you compute? Can you encode an image in normal sounding audio?
  - If the input image is in fact a spectrogram, how well can you estimate the audio signal that produced it? This is in fact a very challenging phase retrieval problem that is still an area of active research. What makes this such a hard problem?

Please zip together your MATLAB code, example image(s) and summary and email them to `eesser@uci.edu`.