Amath390 Mathematics & Music
Quiz 2
Friday November 4 4:30-6pm
STC0010

This quiz will cover the material on percussion (drums and idiophones), frequency response and samping in the lecture notes. Some of this material relies on the topics covered earlier in the course. In particular, you should be able to:

- understand the solution of the wave equation in two dimensions and be able to calculate the natural frequencies
- solve the beam equation in one dimension
- understand how the natural frequencies, their spacing and relative strength, affect the sound of an instrument
- outline the assumptions in the derivation of the model for a drum as a vibrating membrane
- outline the assumptions in the derivation in the model for idiophones as vibrating beams
- define frequency response, Fourier transform, impulse distribution, Nyquist rate, frequency, phase shift, Hertz, resonance, pitch, timbre, fundamental frequency, harmonic, overtone
- calculate complex form of a Fourier series and relate it to the real form
- calculate Fourier transforms and inverse Fourier transforms
- calculate the rate at which a signal needs to be sampled
- be able to explain what happens, mathematically and terms of the sound, if a signal is not sampled sufficiently often

You will need a pink tie calculator; no other aids will be allowed. A page of information on Bessel functions and their zeros will be provided (just in case it is useful).

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