Music 270a: Digital Audio Processing
Assignment #4
Due: Monday, November 18, 2019

1. Consider a waveshaping function from the following polynomial

$$f(x) = x + x^3 + x^5 + x^8,$$

driven with a unit-amplitude sinusoid.

   (a) Using Pascal's triangle, compute the magnitude of each component in the the spectrum.

   (b) Implement in Matlab using *both* direct algebraic and wavetable implementations (using linear interpolation for the latter).

   (c) Plot the magnitude of the spectrum (on a linear scale) produced by *both* implementations. Is there a difference?

   (d) Compare your implementation with your theoretical expectation.

2. Synthesize an instrument of your choice using waveshaping synthesis and spectral matching with Chebyshev Polynomials. Include

   (a) the *original* sound from which you modeled your instrument,

   (b) the m-file(s) used to generate your synthesis, and

   (c) your best example synthesis.