Lab 5 solutions

Part I
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1) sketches of sine, triangular, square, and sawtooth waves
2) triangular wave
3) sawtooth wave
4) sawtooth wave

Part I.A

Table 1: sawtooth waveform
N=1 f_1 = 500 Hz A_1 = 100%
N=2 f_2 = 1000 Hz A_2 = 50%
N=3 f_3 = 1500 Hz A_3 = 33%
N=4 f_4 = 2000 Hz A_4 = 25%
N=5 f_5 = 2500 Hz A_5 = 20%

Part I.B

Table 2: square wave
N=1 f_1 = 500 Hz A_1 = 100%
N=3 f_3 = 1500 Hz A_2 = 33%
N=5 f_5 = 2500 Hz A_3 = 20%
N=7 f_7 = 3500 Hz A_4 = 14%
N=9 f_9 = 4500 Hz A_5 = 11%

Part I.C

Table 3: triangular waveform
N=1 f_1 = 500 Hz A_1 = 100%
N=3 f_3 = 1500 Hz A_2 = −11%
N=5 f_5 = 2500 Hz A_3 =   4%
N=7 f_7 = 3500 Hz A_4 = −2%
N=9 f_9 = 4500 Hz A_5 = 1.2%

1) triangular wave
2) sawtooth waveform
3) add more harmonics
4) you hear the contribution from the harmonics of the 1 Hz
fundamental that have frequencies greater than 20 Hz

Part II.B
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1) The synthesized tone only uses a few harmonics. Also, a real
didgeridoo has small contributions from even harmonics as well.