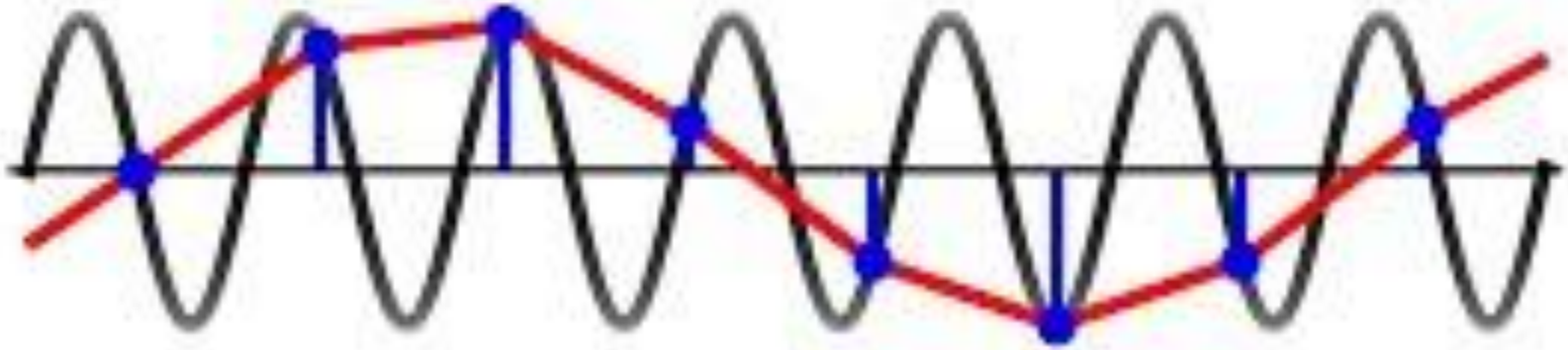
MUS 7: Digitalization of Sound

Instructor: Jingwei Liu

S124 UC San Diego

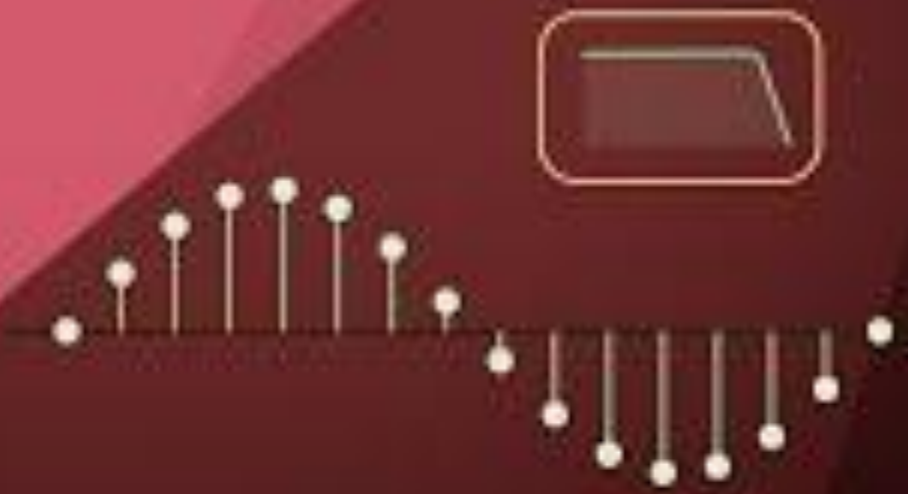


Aliasing and Nyquist

DIGITAL AUDIO FUNDAMENTALS

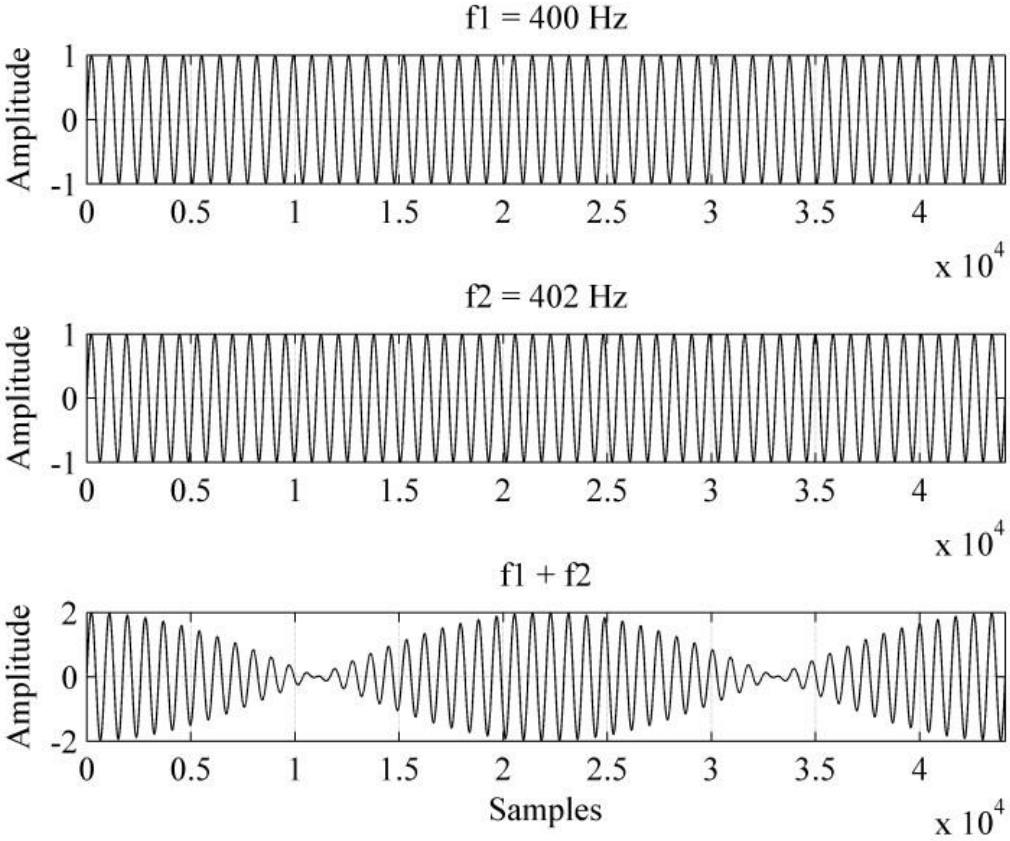
2

SAMPLING THEOREM

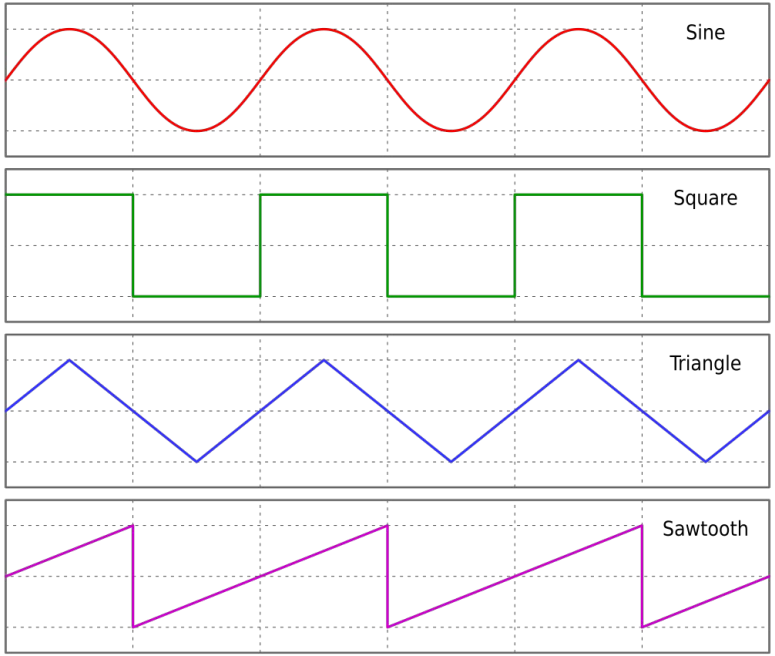


Beating

$$\cos A + \cos B = 2\cos(\frac{A-B}{2})\cos(\frac{A+B}{2})$$



Harmonic Waves

Table 1: Other Simple Waveforms Synthesized by Adding Sinusoids

Type	Harmonics	Amplitude	Phase (cosine)	Phase (sine)
square	$n = [1, 3, 5, ..., N]$ (odd)	$1/n$	$-\pi/2$	0
triangle	$n = [1, 3, 5, ..., N]$ (odd)	$1/n^2$	0	$\pi/2$
sawtooth	$n = [1, 2, 3, ..., N]$ (even and odd)	$1/n$	$-\pi/2$	0