1

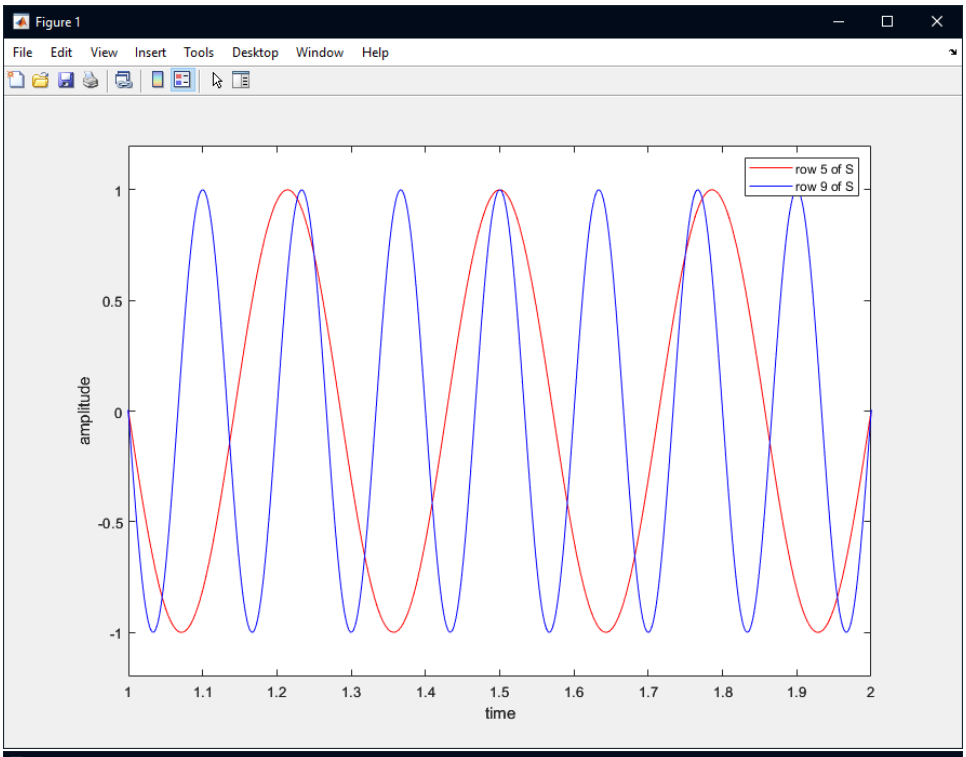
a.) the amount of pixels in my phone camera is 12 megapixel (4000 x 3000) or 12,000,000 pixels

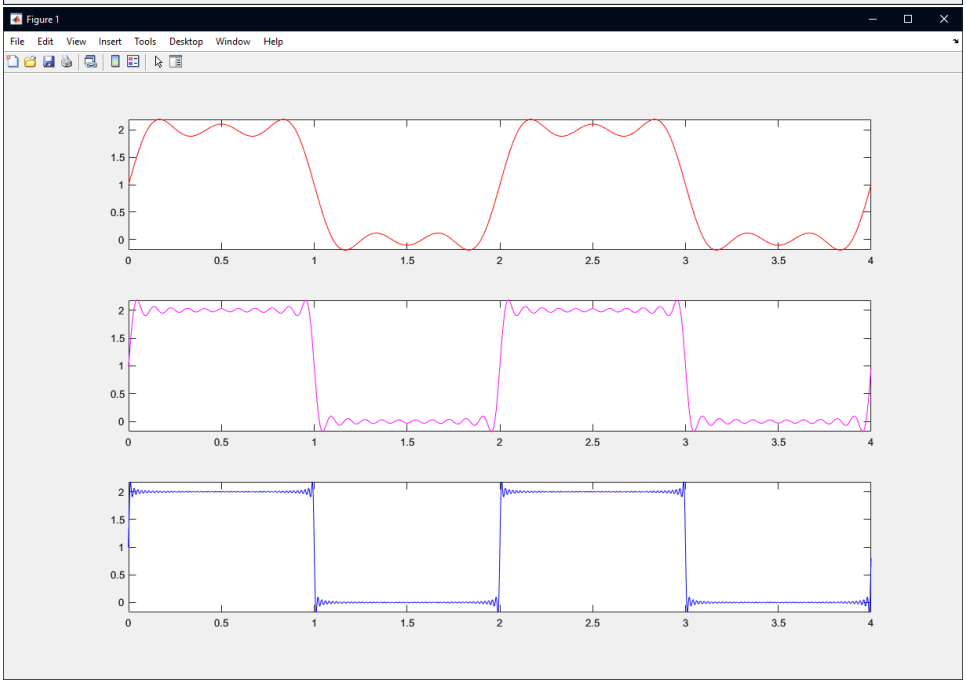
b.) if each pixel needs 3 bytes then 12,000,000 * 3 = 36,000,000 bytes or 34.33 megabytes

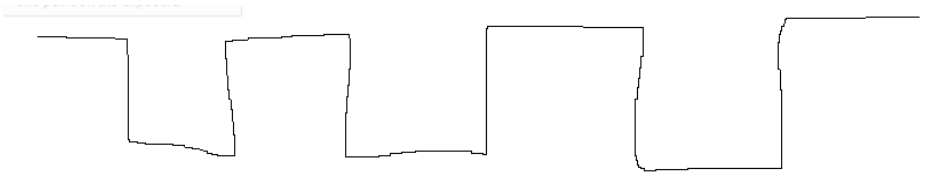
c.) in an actual picture only takes 3.83 megabytes

d.) 34.33/3.83 = 8.96 code rate; the code rate of mp3 is 11 so the image compression is not as effective as audio compression

2.

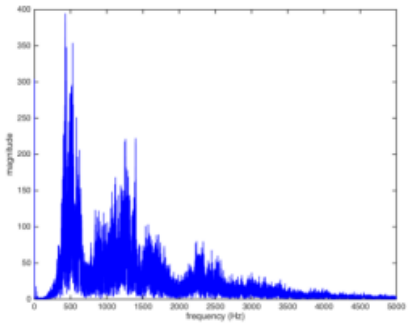




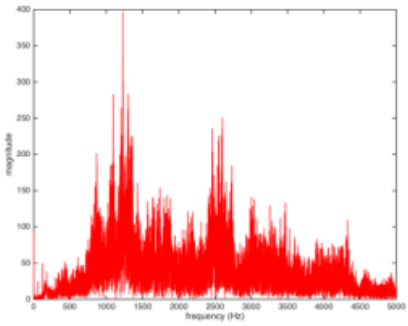


If you sum a very large number of sinusoids, I believe it will graph a very neat square wave

3.



Spectrum 1



Spectrum 2

A.) I believe that spectrum 1 goes with boo and spectrum 2 with yay

I believe this because a booing sound is a more bassy sound than a yay sound, so the spectrum with more lower frequencies fits better to the boo sound and then yay has more higher frequencies so it fits better with the second spectrum

B.) the spectrum of clip 1 fits best on the spectrogram at between 4 and 6 seconds, somewhere around 5 seconds, I believe this because the strongest signal at 500 Hz matches best, also the smaller frequencies line up as well

The spectrum of clip 2 fits best at about 2 seconds because the most prominent frequency at around 750 Hz matches and the separation of each peak frequency is about the same whereas later in the graph it does not match up so well.

4.

a.) audio modulating frequency signals in FM radio have a Nyquist frequency of 15 kHz so to avoid aliasing we should aim for a sampling rate above 30 kHz

b.) through the 6db rule, we would need at least 14 bits per sample to have an SQNRdb of >80 dB

c.) 35000 Hz with 12 bits per Hz is 420,000 bits per second which is 100800000 bits per 4 minutes which is 12600000 bytes for a 4 minute long song, for a dual channel song you would need twice as many bytes or 25200000 bytes

5.

a.) 6000 nyquist frequency

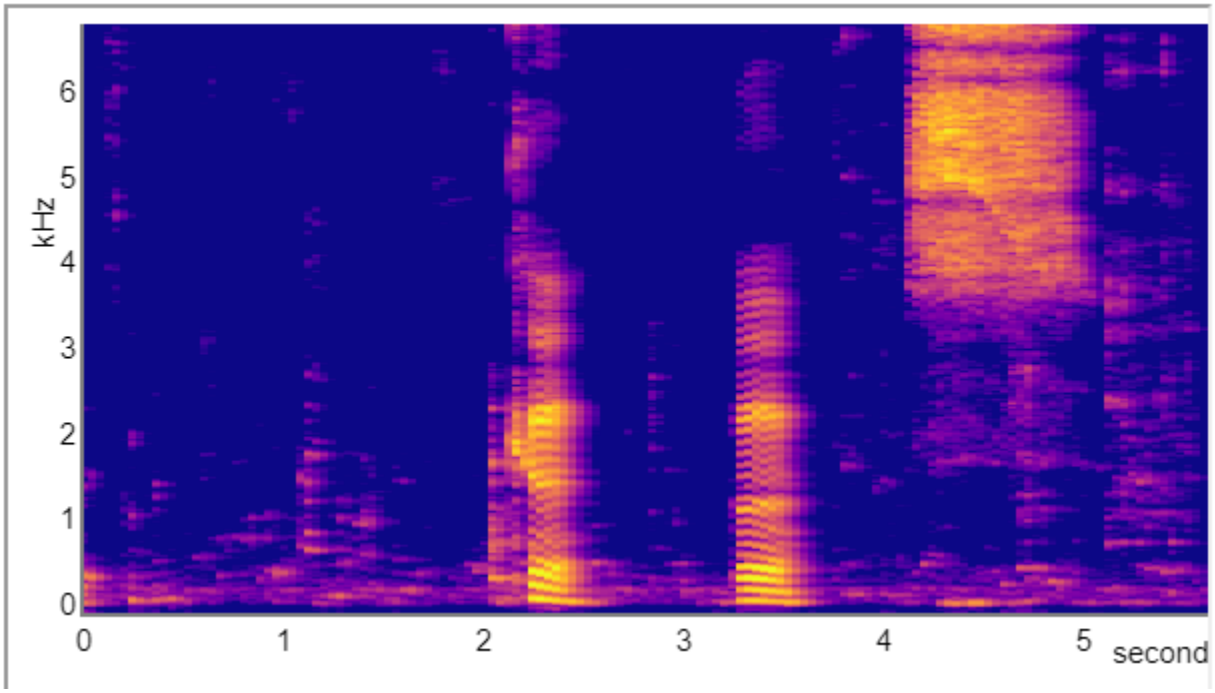
sample rate 5512/2 = 2756

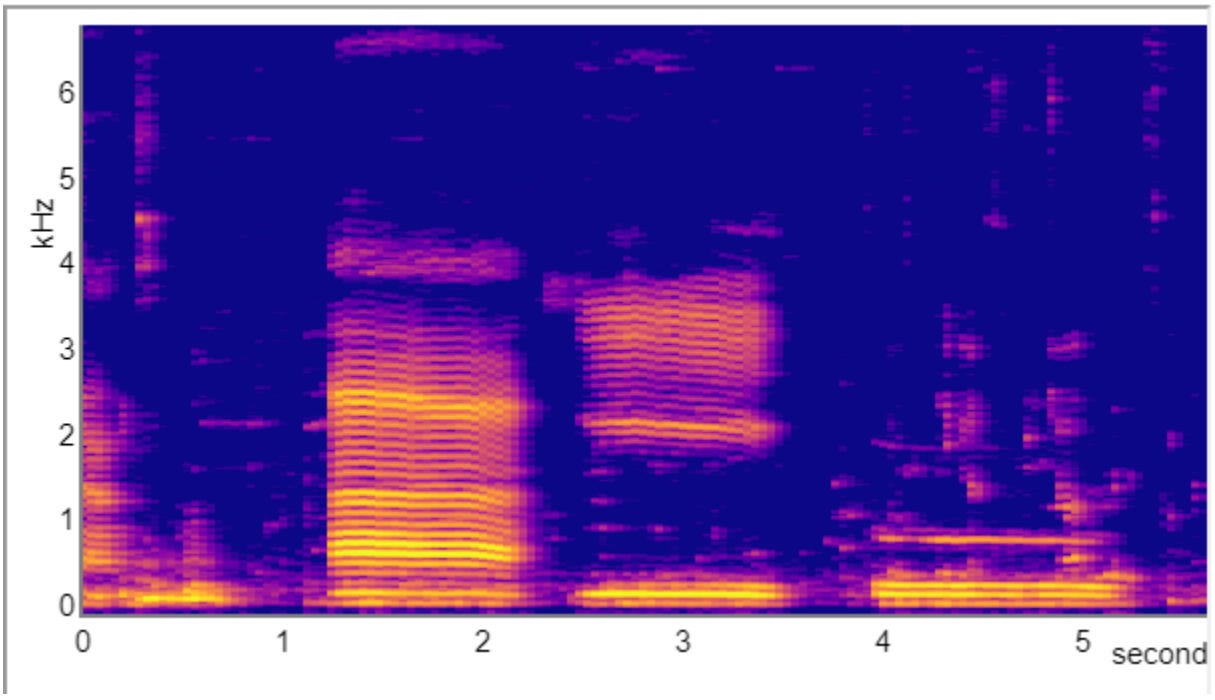
2756 Hz – 6000 Hz there will be aliasing

b.) the sampling rate would have to be any factor of the frequency in order to take a sample every time the sinusoid looks the same at each sample taken

c.) 30 frames/sec, every 20 rotations of the propeller a picture is taken for the camera, taking in consideration the time period, it is more likely that it is recorded at 30 fps instead of the more modern standard of 60 fps

k b sss

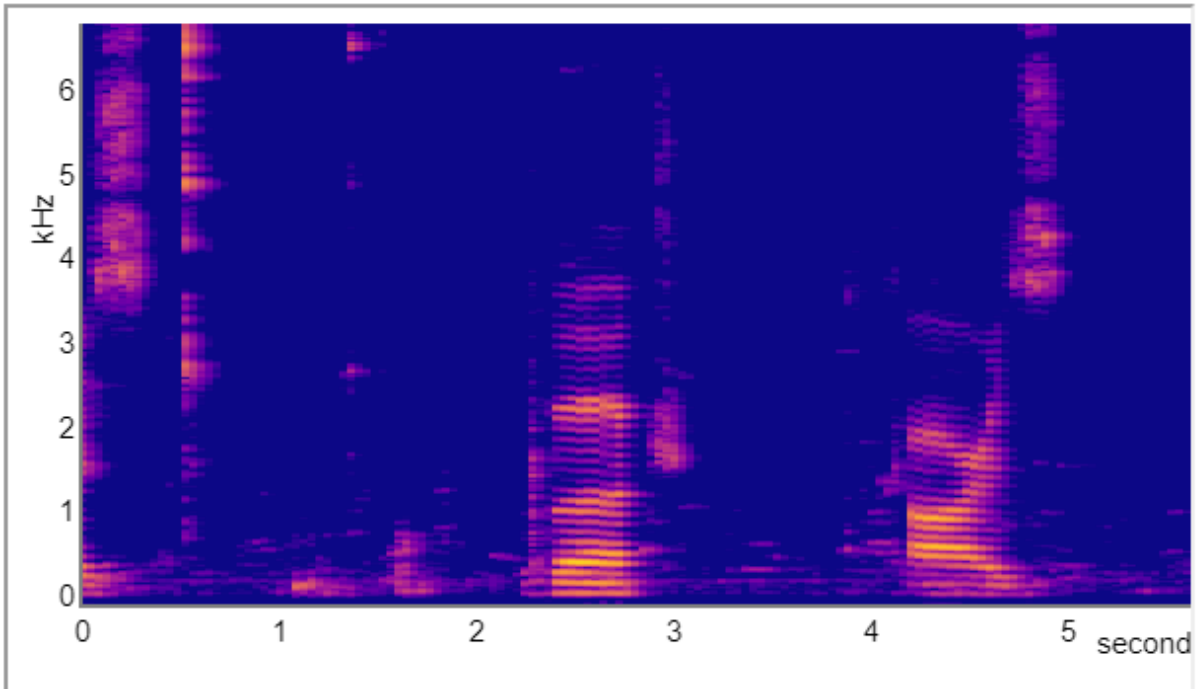




Aaa eeee ooooo

for each sound, there were different frequencies and a different range for those frequencies, the sss sound has lots of high pitched frequencies where the ooo sound was a very low range but very prominent at around 200 kHz

Book cars



In book you can see the b sound in the beginning carrying over the ooo sound in the middle, then you can see the soft pillar where the k sound is

In cars you can see the k sound in the beginning and the a sound carrying over in the middle, at the end you can see the r sound sweep up into the s sound