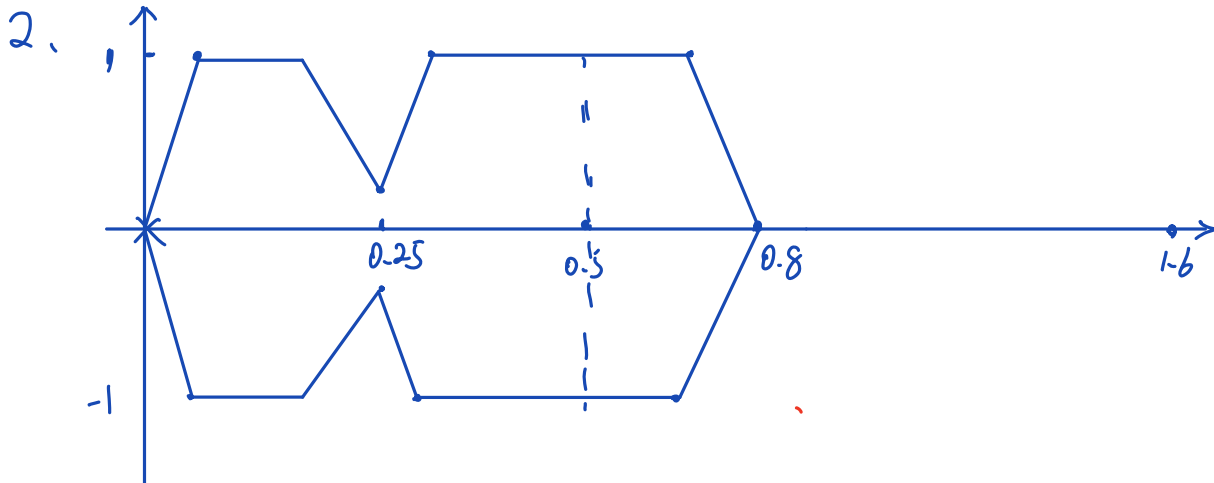


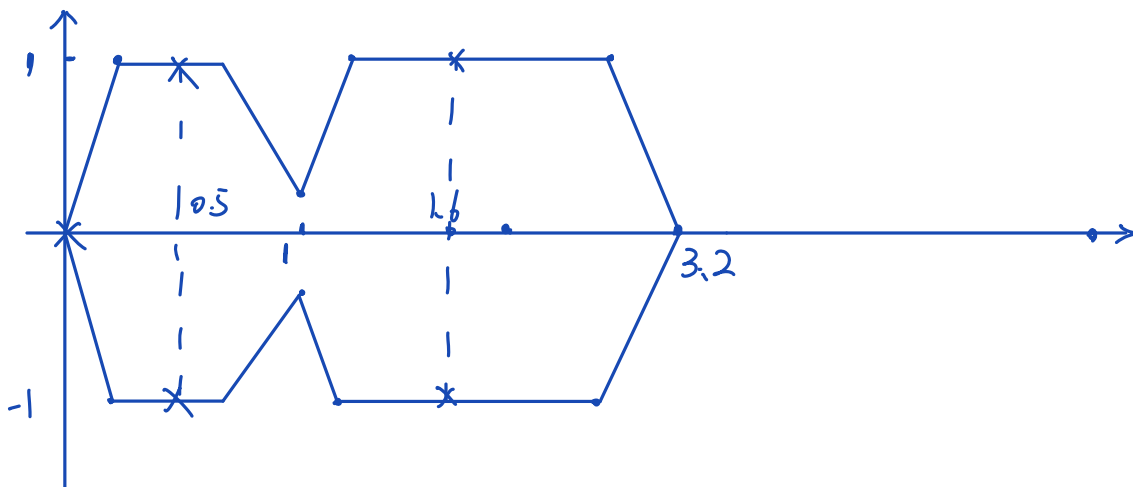
1. $T = \frac{1}{32\text{kHz}} = 0.03125\text{ms}$

$T_{\text{new}} = \frac{1}{16\text{kHz}} = 0.0625\text{ms}$ it will be longer

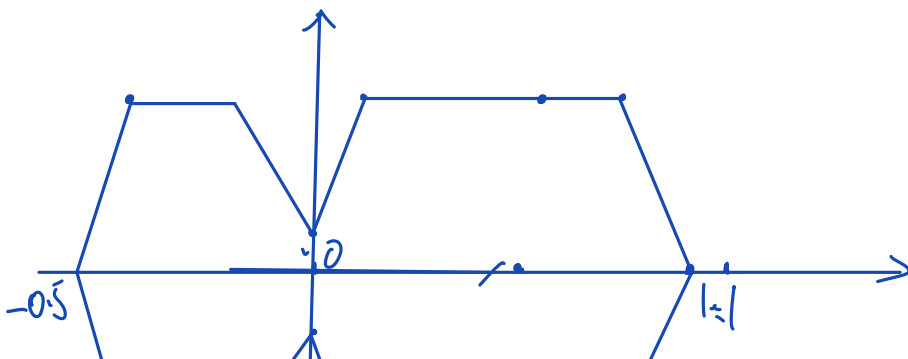
since the low sampling frequency can cause high frequency get wrapped or aliased back over the low frequency, so the sound will have lower quality

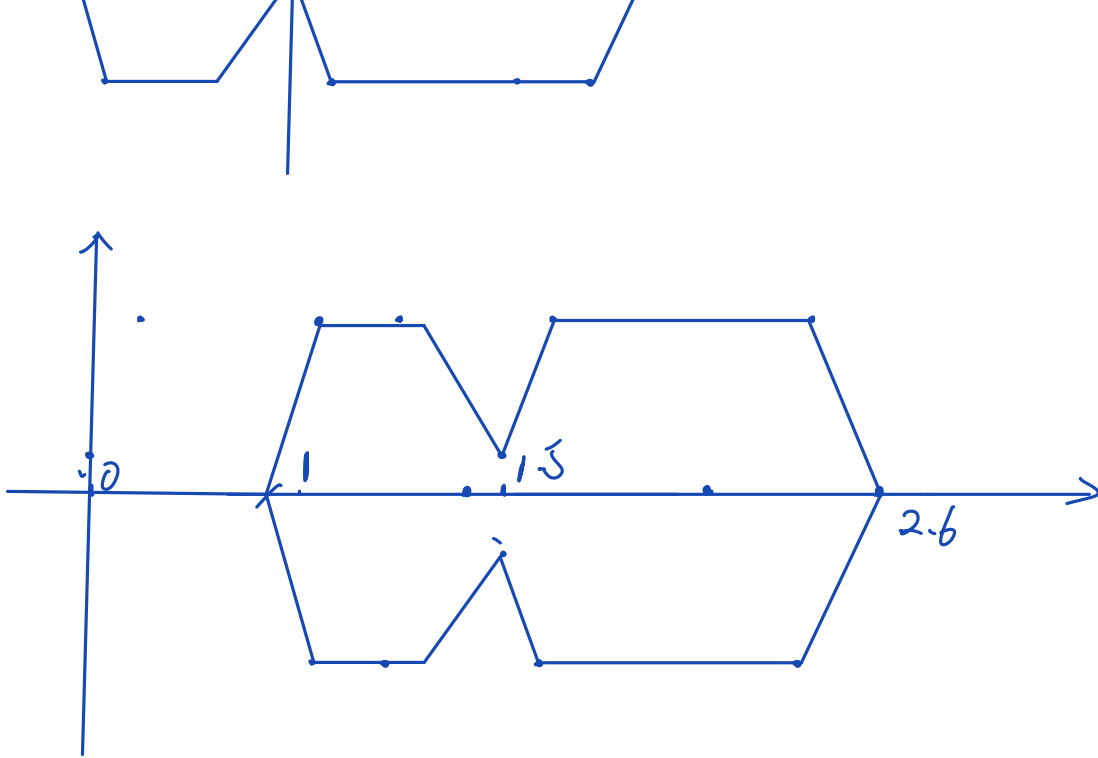


higher frequency



lower frequency





3. $f_s = 32 \text{ kHz}$

$$n_1 = \frac{1}{0.00003125} = 32000$$

$$n_2 = \frac{1}{0.0000625} = 16000$$

4. $y = (5t)$ and $y = (t + 0.5)$ will require you to throw away some of the signal

if the signal is digitalized, computer only store signal on time that is an integer, if we do scaling first, we lose data because we cannot represent $\frac{t}{2}$, then we shift by 1.5 which is not an integer, by doing that we lose data twice. if we shift signal by 3 we don't lose data, so we will only lose data once instead of twice