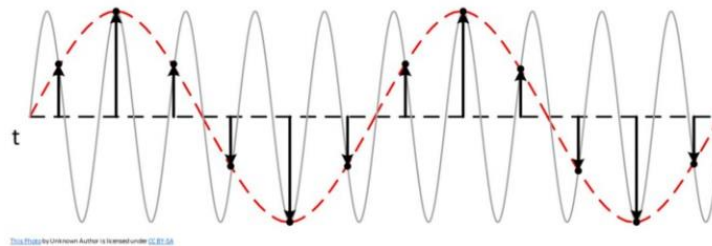


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Assignment Lesson 10

Research on Nyquist sampling theorem:

- The Nyquist Theorem, also known as the sampling theorem, is a principle that engineers follow in the digitization of analog signals, a theorem stating that when an analogue waveform is digested, only the frequencies in the waveform below half the sampling frequency will be recorded.
- The necessary condition of reconstructing a continuous signal from the sampling version is that sampling frequency: $f_s < 2f_{\max}$
 - o $2f_{\max}$ is the highest frequency component in the signal.
 - o If a signal's frequency components are restricted in $[f_1, f_2]$, we need $f_s > 2(f_2 - f_1)$



$$f = \frac{c}{\lambda}$$

f – frequency
 c – speed of light
 λ – wavelength

- The wavelength of signal in red wave (reference signal) is λ and frequency f .
- The wavelength of signal in black wave (sampling signal) is $1/5 \lambda$ and frequency $5f$.
- The characteristics of the reference signal is preserved with the sampling frequency 5 times the reference signal. Practically, sampling frequency 2.5 f the reference signal is applied to obtain samples. Oversampling improves resolution but causes aliasing.