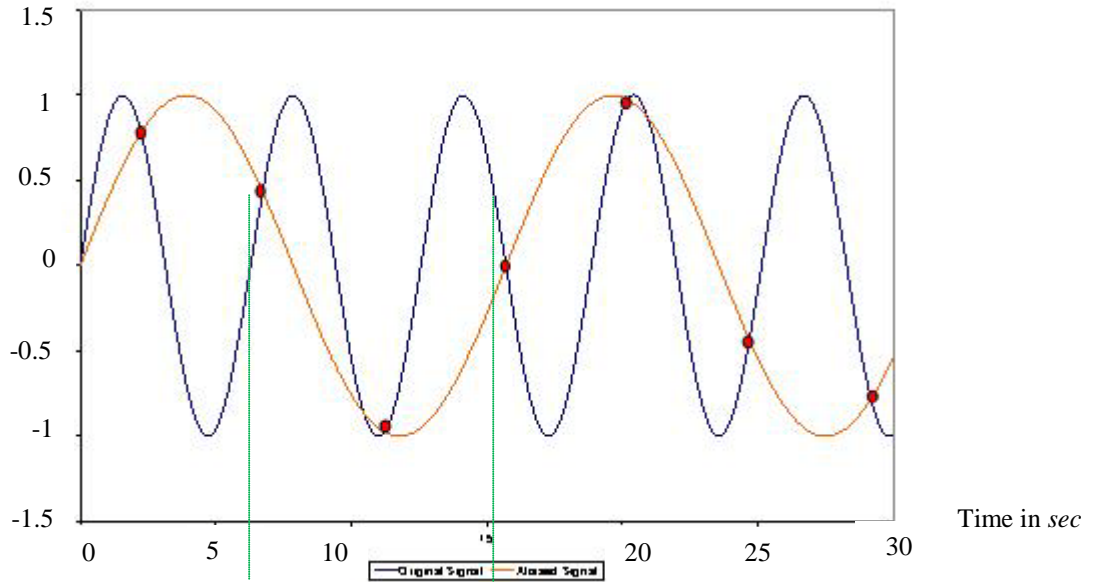


Name: **KEY**

Ver.2

The following figure shows two sinusoidal signals. The one of them is the original signal and the other one is the recovered signal after sampling



Write a time domain expression to represent the two signals

The original signal $= \sin\left(2\pi\left(\frac{1}{6}\right)t + 0\right) = \sin\left(2\pi\left(\frac{1}{6}\right)t\right)$, $1/6=0.1667$ (approximation is accepted)

Signal recovered after sampling $= \sin\left(2\pi\left(\frac{1}{15}\right)t\right)$, $1/15=0.0667$ (approximation is accepted)

Why the recovered signal does not equal to the original signal? **Because the signal is sampled below Nyquist rate**

What do we call this phenomena? **Aliasing**

Sketch the spectrum of the SAMPLED signal . To sketch the spectrum we need to find the sampling frequency. From the plot there are about 7 samples in 30 seconds $\Rightarrow f_s=7/30=0.233$. Alternatively, the folding frequency is the average between the original and recovered frequency. $f_s/2=(f_L+f_H)/2 \Rightarrow f_s=f_H+f_L=1/6+1/15=(5+2)/30=7/30=0.233$.

