26) Let us consider the analog sinusoid as

$$x(t) = \cos(\Omega_0 t)$$

The fourier transform of $x(t)$ will be

$$X(\Omega) = 2\pi \int_{-\infty}^{\infty} e^{-j\Omega t} \cos(\Omega_0 t)\,dt$$

$$= 2\pi \int_{-\infty}^{\infty} e^{-j\Omega t} \left(\frac{e^{j\Omega_0 t} + e^{-j\Omega_0 t}}{2} \right) dt$$

$$= \frac{\cancel{2}\pi}{\cancel{2}} \int_{-\infty}^{\infty} \left[e^{-(\Omega - \Omega_0)jt} + e^{-(\Omega + \Omega_0)jt} \right] dt$$

$$\boxed{X(\Omega) = \pi \left[\delta(\Omega - \Omega_0) + \delta(\Omega + \Omega_0) \right]}$$

Now consider $x[n] = x(nT_s) = \cos\left(\Omega_0 . n . \frac{2\pi}{\Omega_s}\right)$

$$= \cos\left(2\pi \frac{\Omega_0}{\Omega_s} . n\right)$$

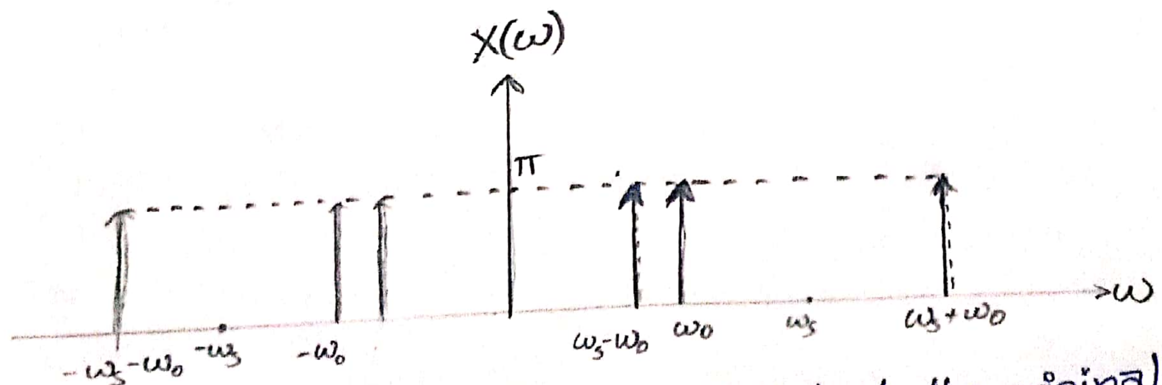
$$x[n] = \cos(\omega_0 n)$$

The fourier transform of $x[n]$ will be

$$\boxed{X(\omega) = \sum_{K=-\infty}^{\infty} \pi \left[\delta(\omega - \omega_0 + \omega_s K) + \delta(\omega + \omega_0 + \omega_s K) \right]} \approx \sum_{n=-\infty}^{\infty} X(\Omega)\delta(\Omega - n\Omega_s)$$

So it is periodic with period ω_s.

if we consider $\omega_0 > \frac{\omega_s}{2} \Rightarrow \omega_0 - \omega_s < \omega_0$ [so there will be aliasing]



As there is aliasing we cannot construct back the original signal

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