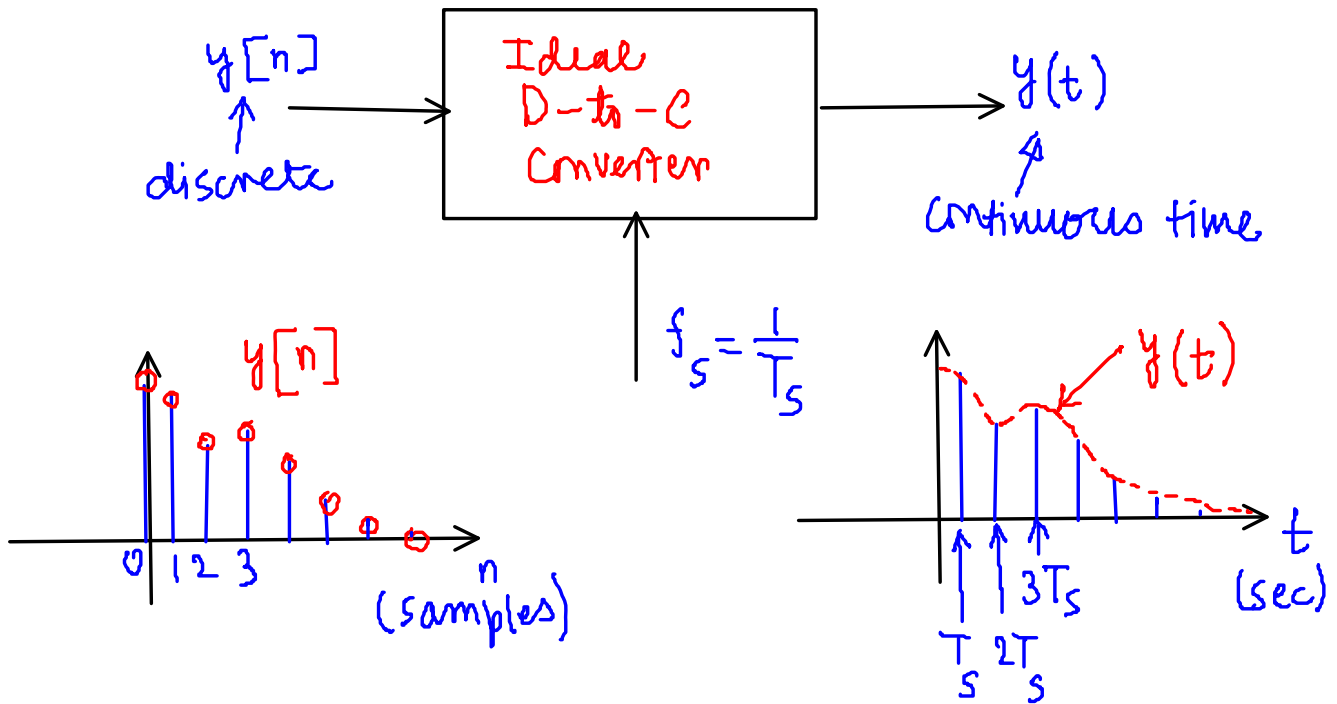


4-1.5 Ideal Reconstruction

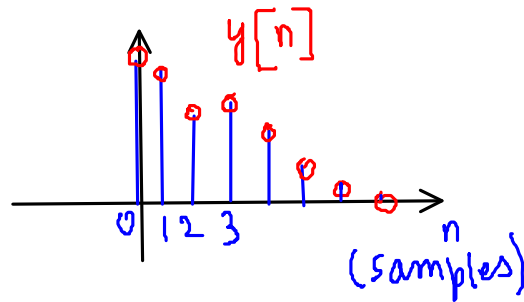
Ideal D-to-C conversion



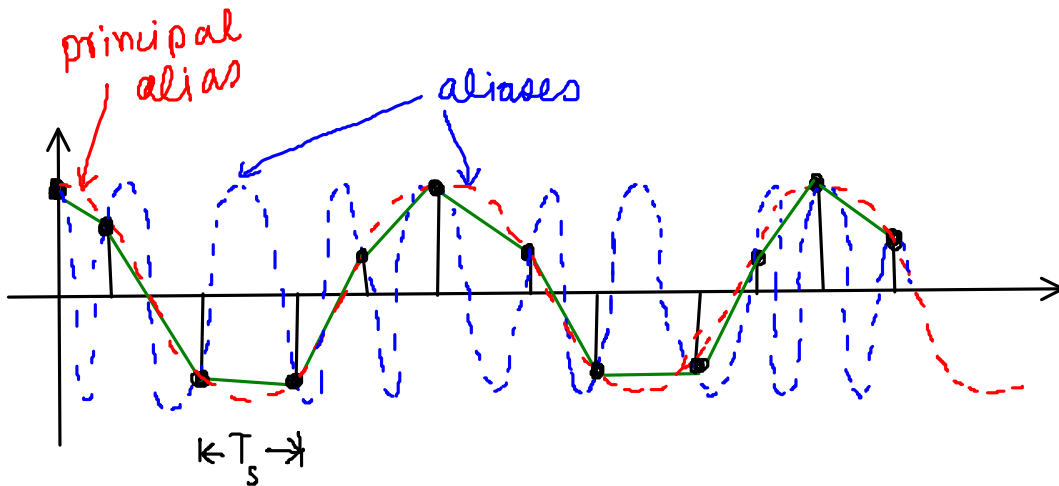
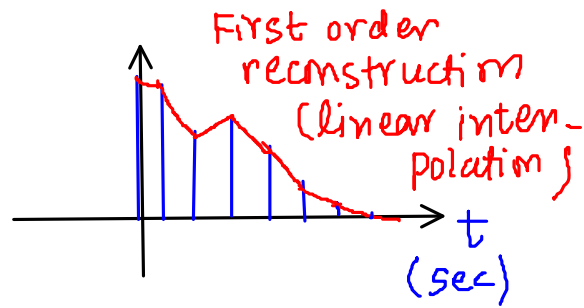
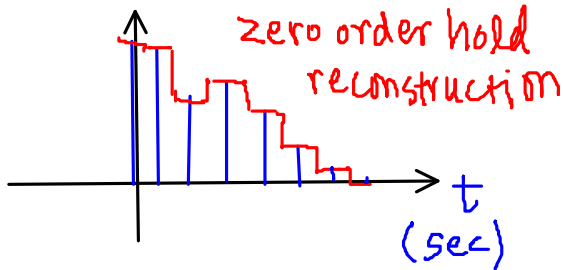
$$y(nT_s) = y[n]$$

Real D to C converter

(DAC → Digital to Analog Converter)

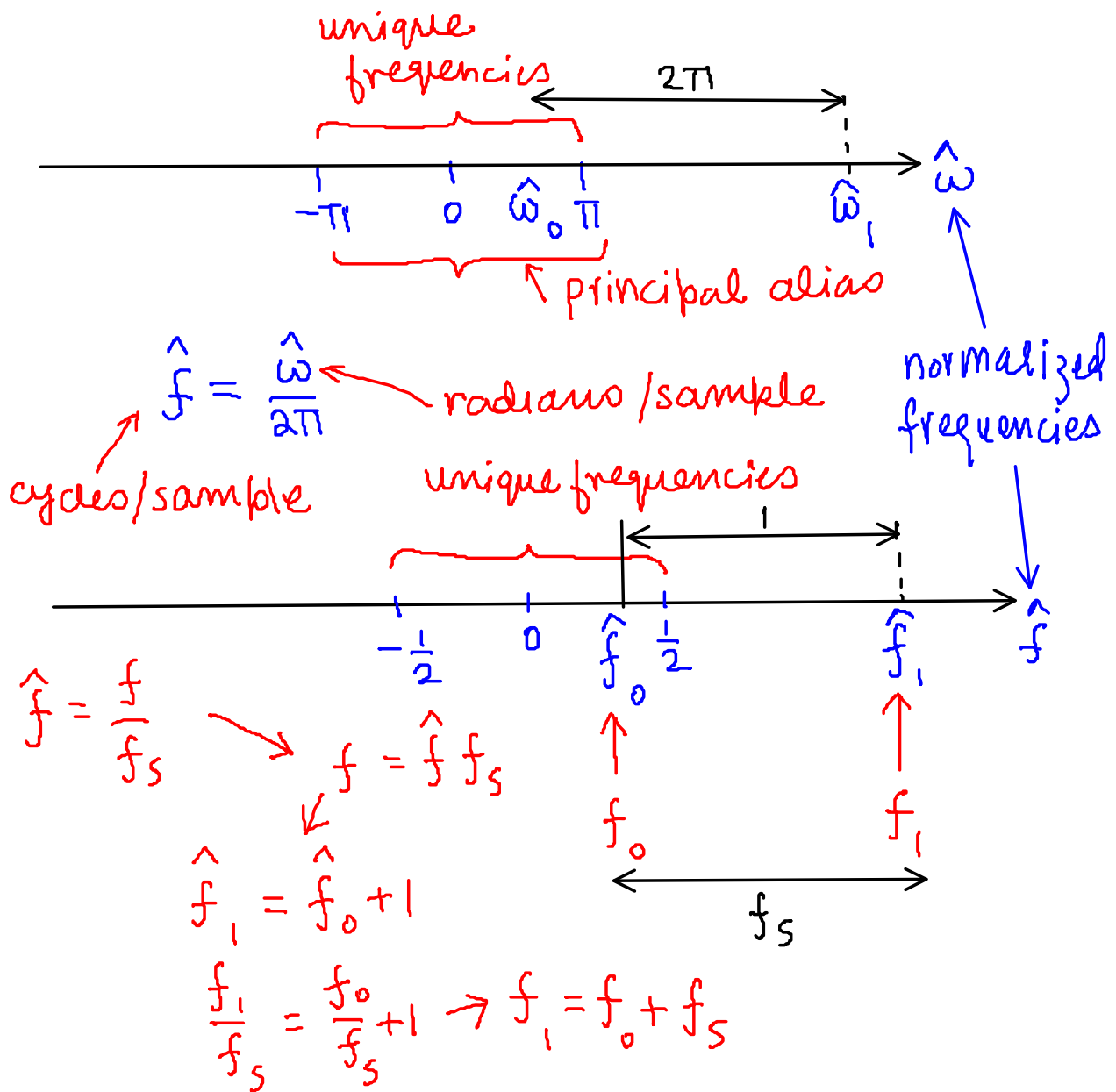


Interpolation

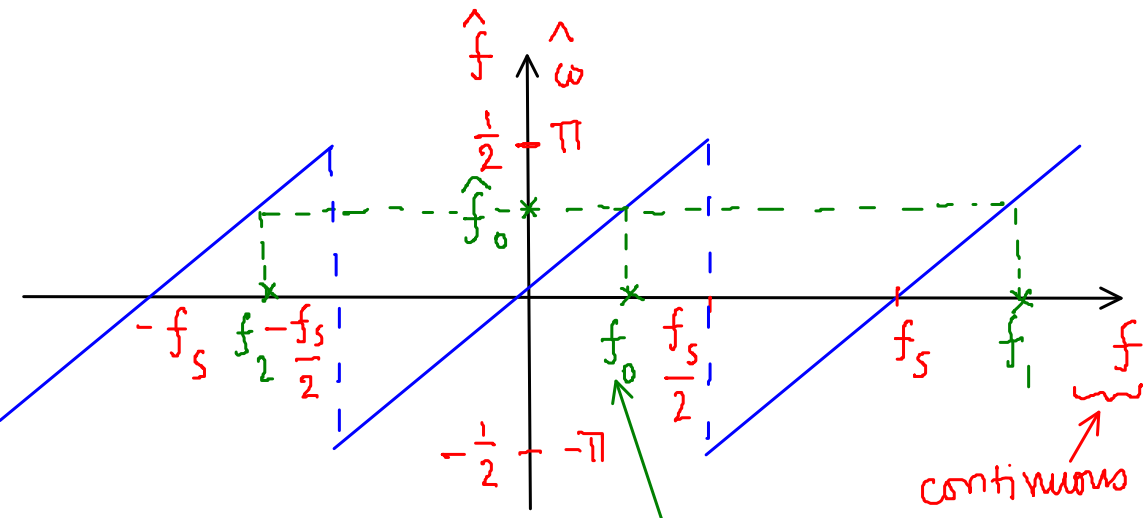
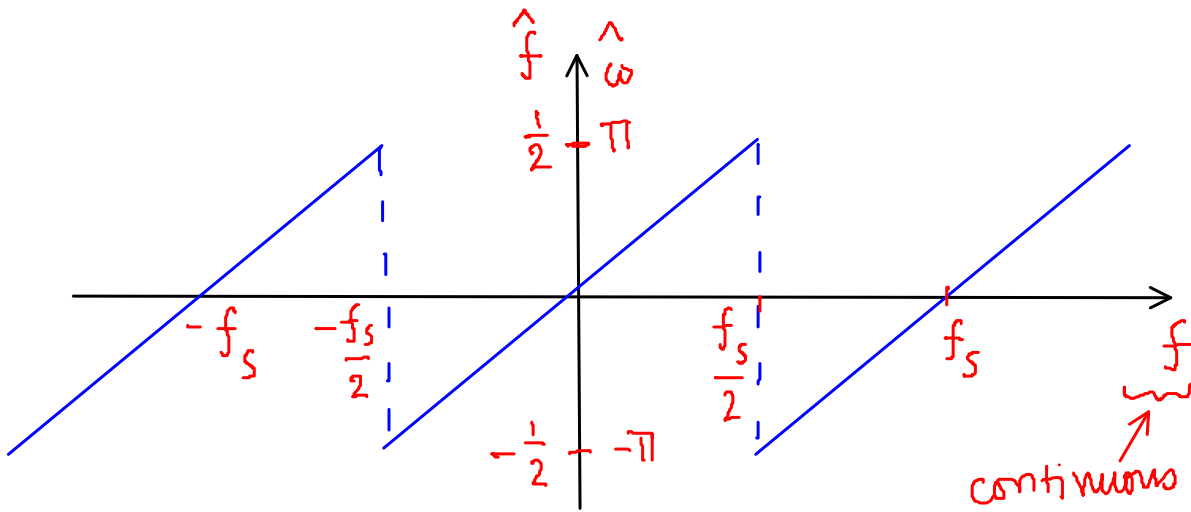


A DAC connects the dots via interpolation
 A DAC "latches on" to the principal alias

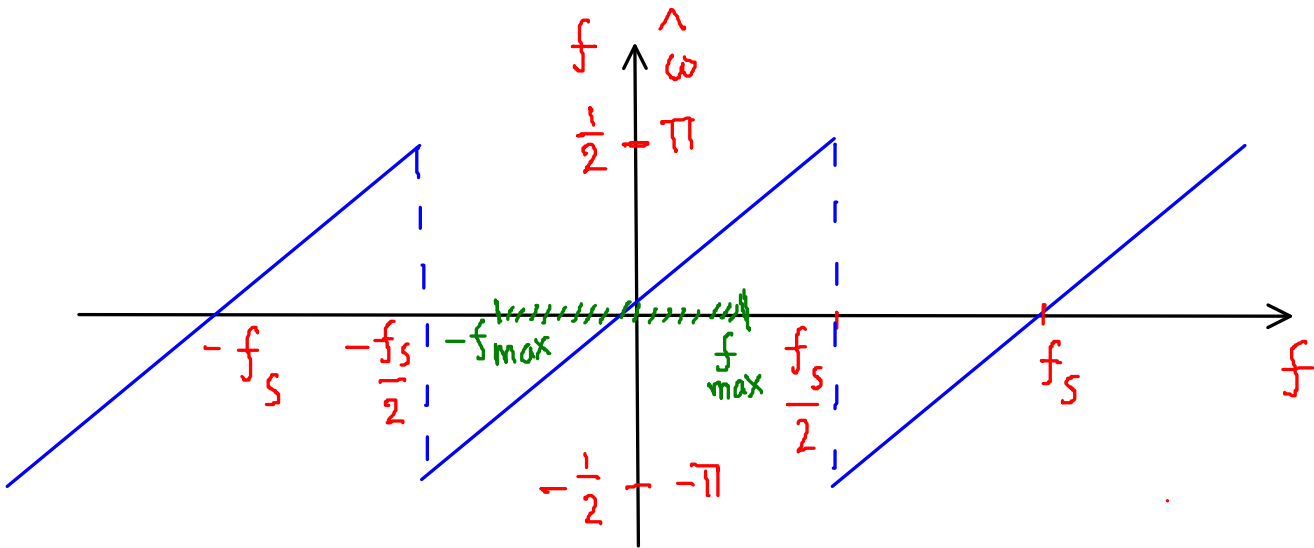
$$\hat{\omega}_1 = \hat{\omega}_0 + 2\pi$$



Discrete

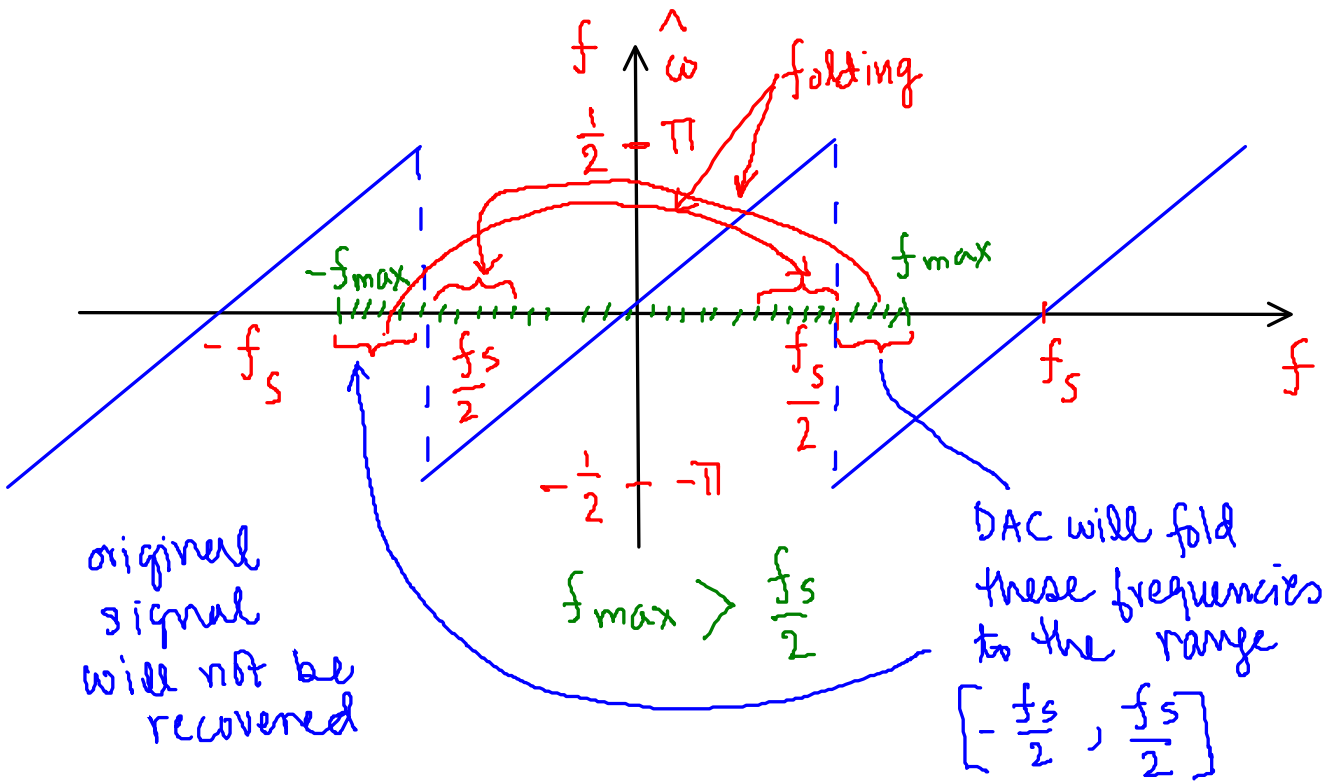


DAC will latch on to this frequency



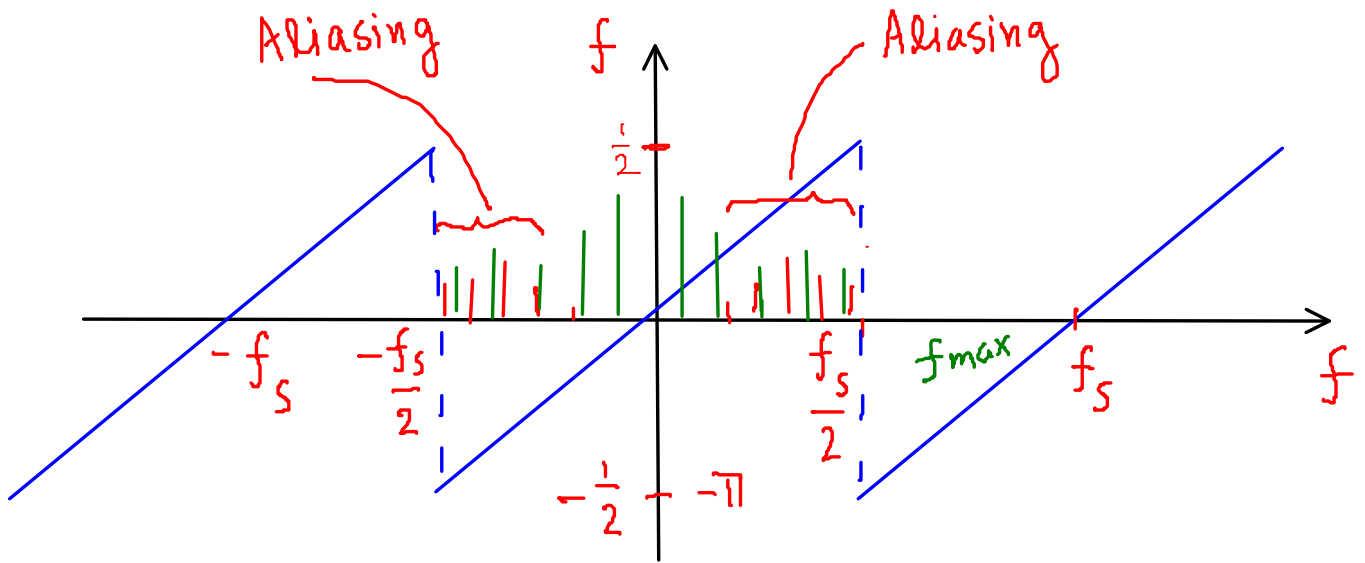
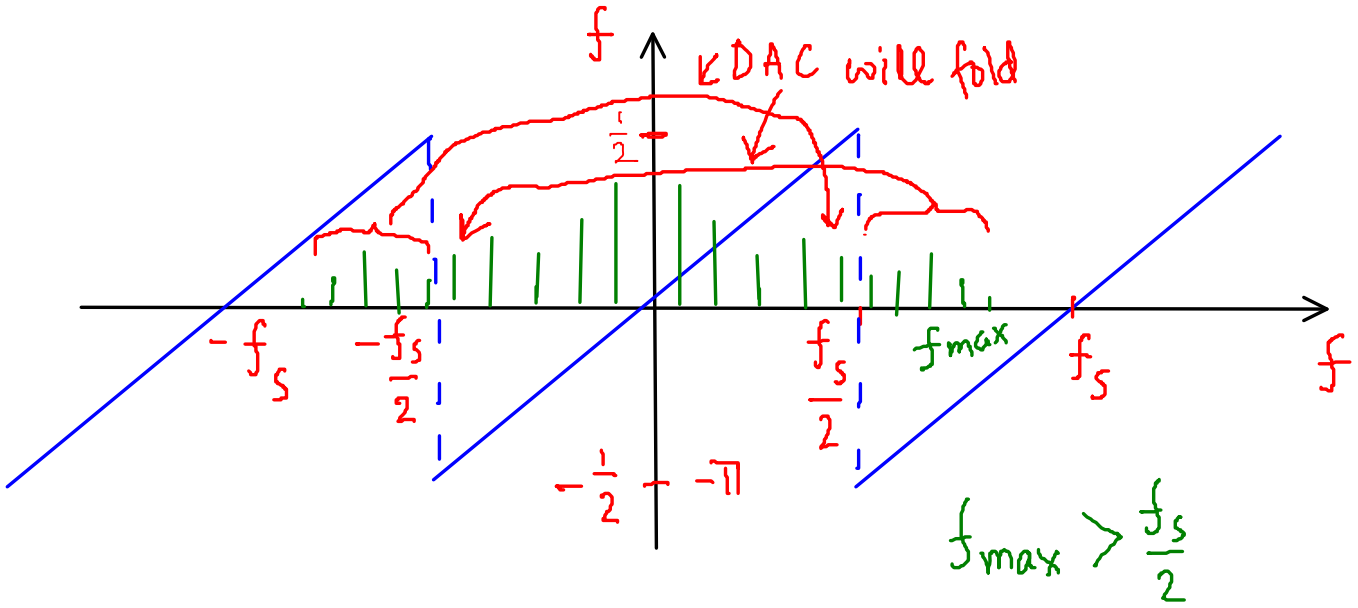
$$f_{\max} < \frac{f_s}{2}$$

ideal DAC will reconstruct the signal exactly

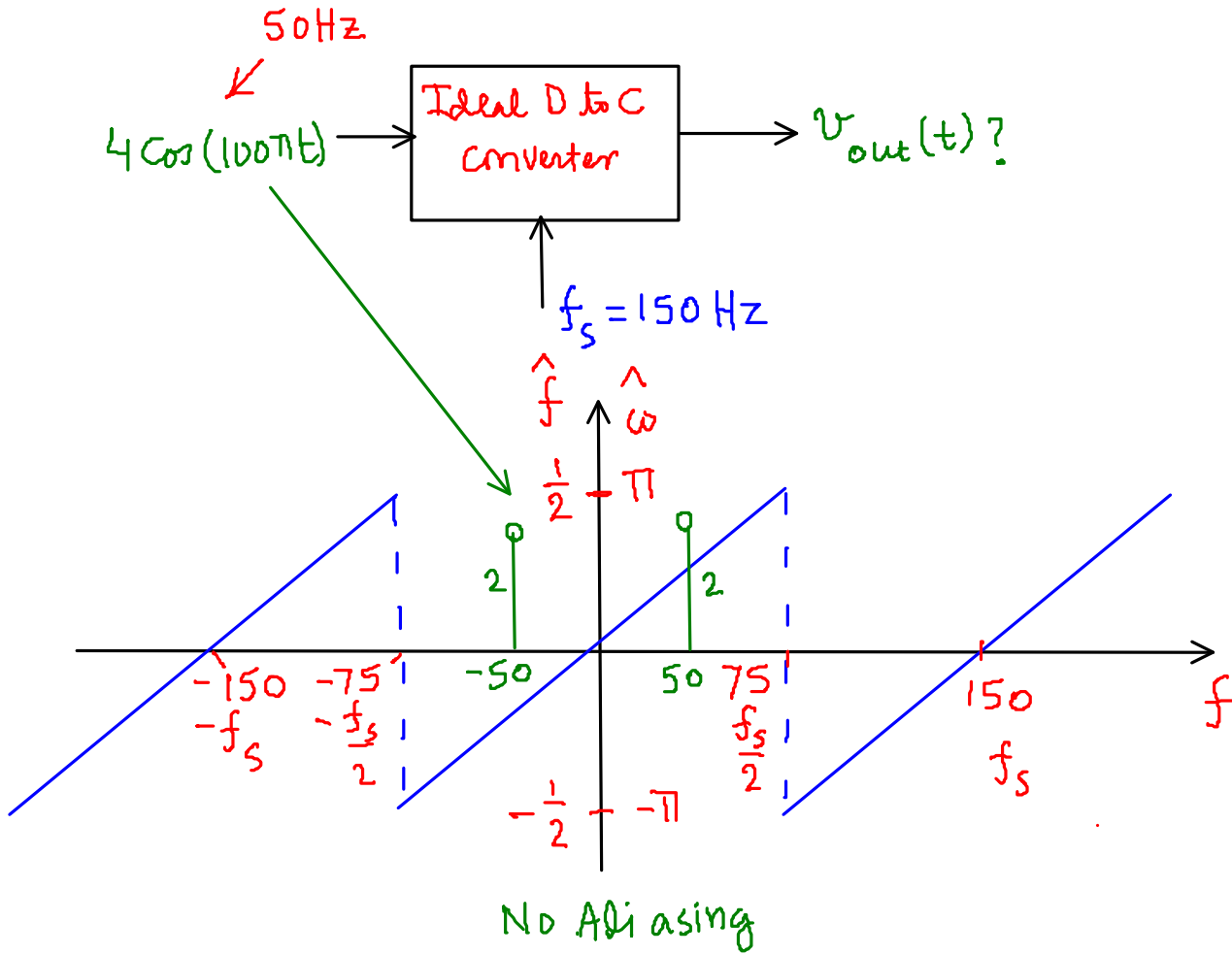


original signal will not be recovered

DAC will fold these frequencies to the range $[-\frac{f_s}{2}, \frac{f_s}{2}]$

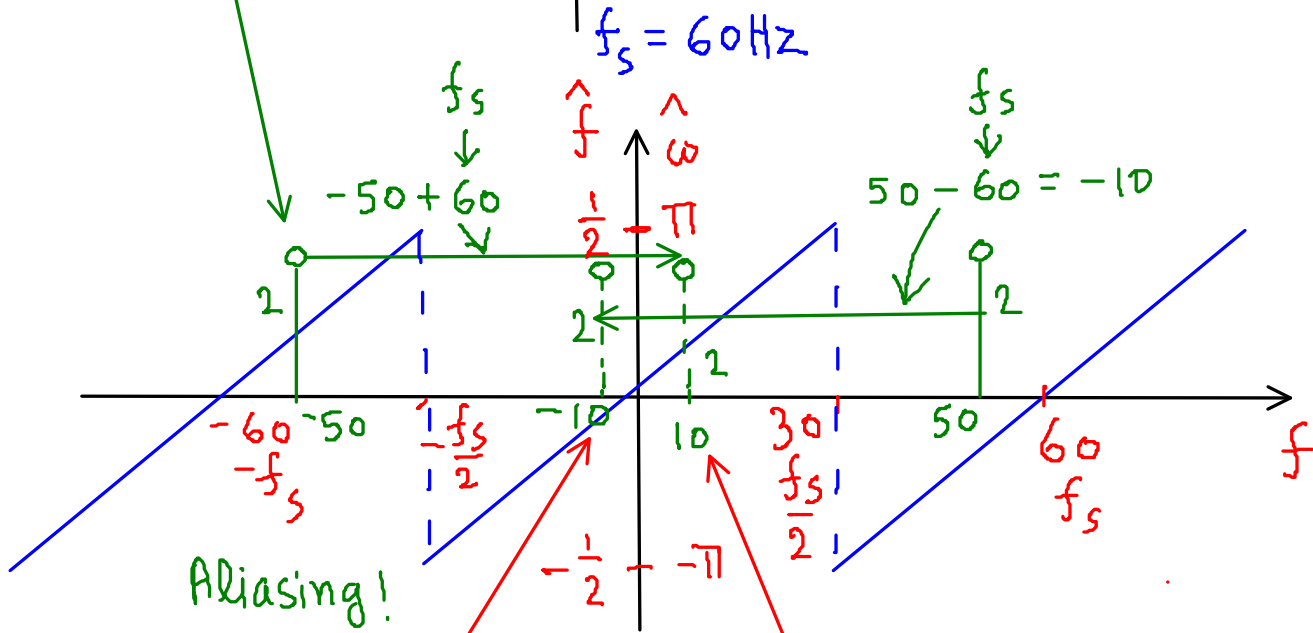
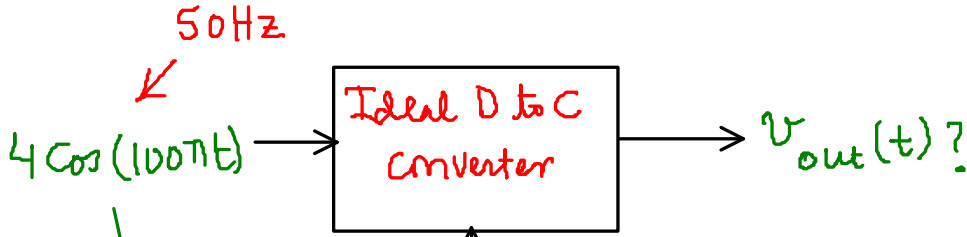


Example



$$v_{out}(t) = 4 \cos(100\pi t)$$

Example



DAC will latch on to these

10Hz frequency

$$v_{out}(t) = 4 \cos(20\pi t)$$

Distortion!