CE Sheet 4 Sol.

Problem 1)

Recall,

- $\text{rect}(\frac{t}{S}) \leftrightarrow \text{Sinc}(\frac{\omega S}{2}).S$

  $\text{Sinc}(t.\frac{S}{2}) \leftrightarrow \frac{2\pi}{S}.\text{rect}(\frac{\omega}{S})$

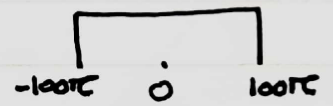
↳ Duality
$x(t) \leftrightarrow 2\pi x(-\omega)$

- In Convolution, the Starting/ending Point of the result is the sum of Starting/ending Points of the inputs.

a) $x(t) = \text{Sinc}(100\pi t)$

→ Need BW

$$\text{Sinc}(100\pi t) \leftrightarrow \frac{2\pi}{200\pi}.\text{rect}(\frac{\omega}{200\pi})$$



BW = 100π rad/s
= 50 Hz

Nyquist Rate = $2 \times B = 2 \times 50 = 100$ Hz

- $F_{s_{min}} = 100$ Hz, $T_{s_{max}} = \frac{1}{100}$ s

  Nyquist rate — Nyquist sampling interval