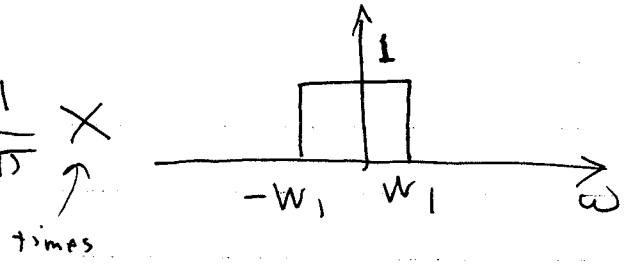
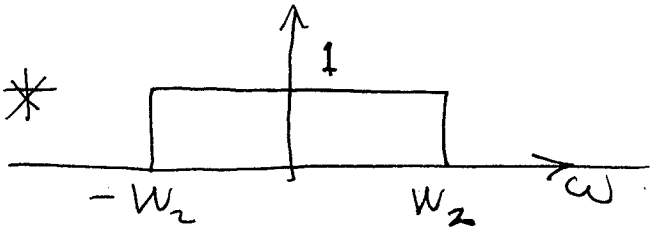
Some Fourier Transform Results involving sinc functions:

- Two sinc functions <u>multiplied in time</u>:

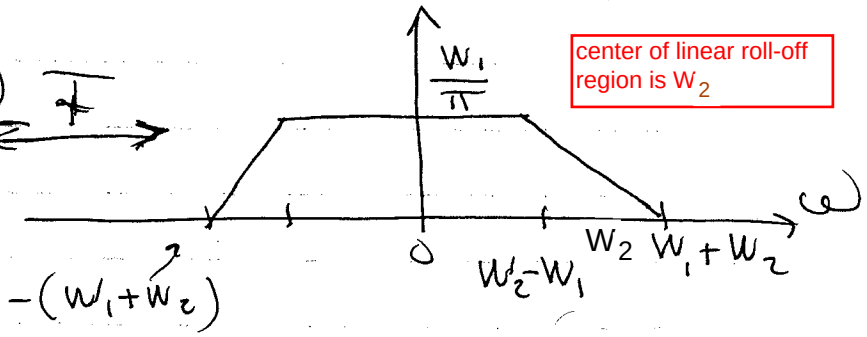
$$\frac{\sin(W_1 t)}{\pi t}\,\frac{\sin(W_2 t)}{\pi t} \overset{\mathcal{F}}{\longleftrightarrow} \frac{1}{2\pi}\mathcal{F}\left\{\frac{\sin(W_1 t)}{\pi t}\right\} * \mathcal{F}\left\{\frac{\sin(W_2 t)}{\pi t}\right\}$$

multiplication in time $\longrightarrow$ convolution in frequency

$\frac{1}{2\pi}$ $\times$ (times) 

$*$ 

$$\frac{\sin(W_1 t)}{\pi t}\,\frac{\sin(W_2 t)}{\pi t} \overset{\mathcal{F}}{\longleftrightarrow}$$

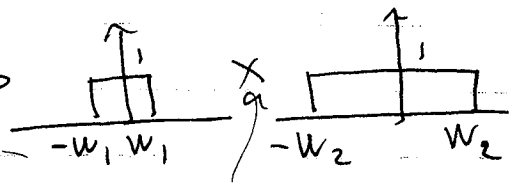


center of linear roll-off region is W_2

$(W_1 < W_2)$

- Two sinc functions <u>convolved in time</u>:

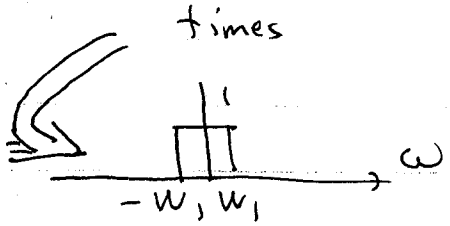
$$\frac{\sin(W_1 t)}{\pi t} * \frac{\sin(W_2 t)}{\pi t} \overset{\mathcal{F}}{\longleftrightarrow}$$



times

$\boxed{W_1 < W_2}$

convolution in time $\rightarrow$ multiplication in frequency



THUS: $\frac{\sin(W_1 t)}{\pi t} * \frac{\sin(W_2 t)}{\pi t} = \frac{\sin(W_1 t)}{\pi t}$

$W_1 < W_2$