

QUIZ 3 - Section 2 Solutions

1) Let $y[n] = x[n-m]$,

a) which FIR filter yields this $h[n]$?

$$y[n] = x[n-m]$$

$y[n] = x[n] * \delta[n-m] \Rightarrow$ convolution with shifted delta function.

$$y[n] = x[n] * h[n]$$

\hookrightarrow So $h[n] = \delta[n-m]$ which is a delay of m units.



b) compute $H(e^{j\omega})$

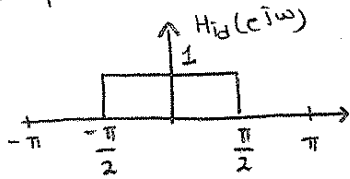
$$H(e^{j\omega}) = \text{DTFT}\{h[n]\}$$

$$H(e^{j\omega}) = \sum_{n=-\infty}^{\infty} h[n] e^{-j\omega n} = \sum_{n=-\infty}^{\infty} \delta[n-m] e^{-j\omega n} \rightarrow \delta[n-m] = \begin{cases} 1, & n=m \\ 0, & n \neq m \end{cases}$$

$$H(e^{j\omega}) = 1 \cdot e^{-j\omega m}$$

$$H(e^{j\omega}) = e^{-j\omega m}$$

2) Compute $h_{id}[n]$ of the following filter



$$h_{id}[n] = \text{IDTFT}\{H_{id}(e^{j\omega})\} \rightarrow \text{See Quiz 3 - Section 1 Solutions question 1 for solution.}$$