



$$y[n] = 0.25x[n-1] + 0.5x[n] + 0.25x[n+1]$$

What is the impulse response? \*

$n$	$x[n]$	$x[n-1]$	$x[n+1]$	$y[n]$
-1	0	0	1	.25
0	1	0	0	.5
1	0	1	0	.25
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0

\* Assume zero initial conditions:

$$x[-1] = 0 \quad y[-1] = 0$$

$$x[-2] = 0$$

$$h[n] = [0.25 \quad .5 \quad .25 \quad 0 \quad 0 \quad \dots]$$

$n=-1 \quad n=0 \quad n=1 \quad \dots$

$$x[n] = \dots \quad h[n] = [0.25 \quad .5 \quad .25]$$

$$h[n] = .25\delta[n+1] + .5\delta[n] + .25\delta[n-1]$$

$$H[z] = .25z^{-1} + .5z^0 + .25z^1$$

$$\sum |h[n]| = \text{bounded}$$

$$h[n] \rightarrow 0 \quad n \rightarrow \infty$$

Finite Impulse Response System  
FIR

Is this system causal?

No -  $h[n] \neq 0$  for  $n < 0$

Is this system stable?

Yes.