

Name: Key

EE432 Fall 2008 Quiz 06

1. A system has impulse response  $h[n] = u[n] + (0.2)^n u[n]$ .

- a. Is the system causal?

Yes -  $h[n] = 0$  for  $n < 0$

- b. Is the system IIR or FIR?

IIR

- c. Is the system stable?

No  $\sum_{n=-\infty}^{\infty} |h[n]| = \infty$

- d. Is the system Recursive or non-recursive?

Recursive - IIR

2. A system has impulse response  $h[n] = 0.5\delta[n+2] - 0.25\delta[n-1] + \delta[n-3]$ .

- a. Is the system causal?

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

- b. Is the system IIR or FIR?

FIR

- c. Is the system stable?

Yes  $\sum |h[n]| < \infty$

- d. Is the system Recursive or non-recursive?

non recursive - FIR

$$y[n] = y[n-1] = \frac{1}{3}x[n] - \frac{1}{3}x[n-3]$$

3. A system is described by:  $y[n] - y[n-1] = \frac{1}{3}x[n] - \frac{1}{3}x[n-3]$ .

a. Is the system causal?

*Yes - output only depends on current + previous inputs/outputs*

b. Is the system IIR or FIR? Are you sure?

*FIR - 3rd order Moving Average Filter*

c. Is the system stable?

$$\text{Yes } \sum |h[n]| < \infty$$

d. Find the impulse response.

$n$	$\frac{1}{3}x[n] = \frac{1}{3}\delta[n]$	$-\frac{1}{3}x[n-3]$	$y[n-1]$	$y[n] = h[n]$
0	$\frac{1}{3}$	0	0	$\frac{1}{3}$
1	0	0	$\frac{1}{3}$	$\frac{1}{3}$
2	0	0	$\frac{1}{3}$	$\frac{1}{3}$
3	0	- $\frac{1}{3}$	$\frac{1}{3}$	0
4	0	0	0	0
5	0	0	0	0

$$h[n] = \frac{1}{3}\delta[n] + \frac{1}{3}\delta[n-1] + \frac{1}{3}\delta[n-2]$$

Bonus: Who was the winning general in the battle of Marengo?

*Napoleon*