جامعة بيرزيت

BIRZEIT UNIVERSITY

Faculty of Engineering and Technology

A

Electrical and Computer Engineering

DSP (Fall 2015)

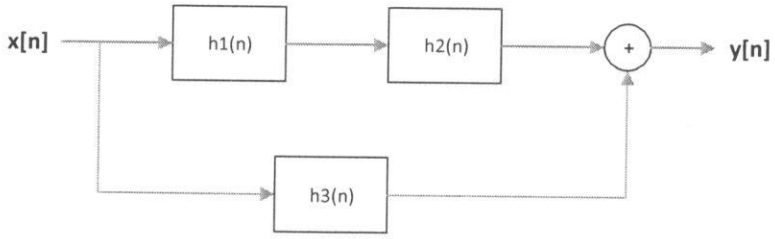
Quiz (1)

Name: Key ID:

(I) Determine the overall impulse response of the following system, where the impulse responses of the component systems are: [7pts]

$h_1(n)=\{-3, \underline{0}, 0, 2\}$, $h2(n) = \{2, 0, \underline{0}, 0, 1\}$, $h3(n) = \{3, \underline{-1}, 2, 0, 7, 0, 5\}$.

$h(n) = [h_1(n) * h_2(n)] + h_3(n)$



$h_1(n) * h_2(n)$?

$-3\ 0\ 0\ 2$

$2\ 0\ 0\ 0\ 1$

$-6\ 0\ 0\ 4$

$-\ 0\ 0\ 0\ 0$

$-\ -\ 0\ 0\ 0\ 0$

$-\ -\ -\ 0\ 0\ 0\ 0$

$-\ -\ -\ -\ -3\ 0\ 0\ 2$

$-6\ 0\ 0\ 4\ -3\ 0\ 0\ 2$

So $h_1 * h_2 = \{-6, 0, 0, \underline{4}, -3, 0, 0, 2\}$ ($n=0$)

$h_1 * h_2 + h_3 =$

$n=0$

$-6\ 0\ 0\ 4\ -3\ 0\ 0\ 2$

$3\ -1\ 2\ 0\ 7\ 0\ 5$ +

$-6\ 0\ 3\ 3\ -1\ 0\ 7\ 2\ 5$

$\Rightarrow h(n) = \{-6, 0, \underline{3}, 3, -1, 0, 7, 2, 5\}$ ($n=0$)

(II) Show if the following sequence is periodic or not. If it is periodic find its fundamental period? [3pts]

$x[n] = A \cos(0.55\pi n)$

$\omega_0 = 0.55\pi$

$\omega_0 N = 2\pi k$

$N = \frac{2\pi k}{55\pi/100} = \frac{2\pi (20/100)}{55\pi/11} k = \frac{40}{11} k \Rightarrow$ at $k = 11 \Rightarrow N = 40$

Periodic, with Period $N = 40$

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B

DSP (Fall 2015)

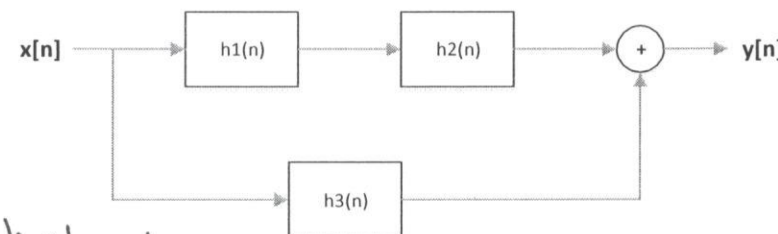
Quiz (1)

Name: Key ID:

(I) Determine the overall impulse response of the following system, where the impulse responses of the component systems are: [7pts]

$h_1(n) = 2\delta(n-2) - 3\delta(n+1)$, $h_2(n) = \delta(n-1) + 2\delta(n+2)$, and

$h_3(n) = 5\delta(n-5) + 7\delta(n-3) + 2\delta(n-1) - \delta(n) + 3\delta(n+1)$



overall $h(n) = [h_1(n) * h_2(n)] + h_3(n)$

```
    -3   0   0   2
     2   0   0   1
 ----------------------------
    -6   0   0   4
     -   0   0   0   0
     -   -   0   0   0   0
     -   -   -  -3   0   0   2
 ----------------------------
    -6   0   0   1   0   0   2
```

so, $h_1 * h_2 = \{-6, 0, 0, \underset{\uparrow n=0}{1}, 0, 0, 2\}$

$h_1 * h_2 + h_3$

```
                ↓n=0
    -6   0   0   1   0   0   2
             3  -1   2   0   7   0   5    +
 ------------------------------------------
    -6   0   3   0   2   0   9   0   5
```

so, $h(n) = \{-6, 0, 3, \underset{\uparrow n=0}{0}, 2, 0, 9, 0, 5\}$

or

$h(n) = -6\delta(n+3) + 3\delta(n+1) + 2\delta(n-1) + 9\delta(n-3) + 5\delta(n-5)$.

(II) Show if the following sequence is periodic or not. If it is periodic find its fundamental period? [3pts]

x[n] = A cos(0.28πn)

$\omega_0 = 0.28\pi$

$\omega_0 N = 2\pi k$

$N = \frac{2\pi k}{\frac{28\pi}{100}} = \frac{100k}{14} = \frac{50k}{7} \Rightarrow \text{at } k = 7 \Rightarrow N = 50$