PROBLEM:

Pick the correct output signal and enter the number in the answer box:

Difference Equation, or $h[n]$, and input	Output Signal
(a) $y[n] = x[n-1] - x[n-3]$ and $x[n] = \delta[n-2]$ **ANS =**	1. $y[n] = \delta[n-1] - \delta[n-3]$
(b) $y[n] = \delta[n-1] * (\delta[n] - \delta[n-2])$ **ANS =**	2. $y[n] = \delta[n-3] - \delta[n-5]$
(c) $y[n] = \sum_{n=0}^{2} x[n-k]$ and $x[n] = 1 + \cos(2\pi n/3)$ for all n **ANS =**	3. $y[n] = \delta[n] - \delta[n-4]$
(d) `yy=conv([1,-1,1,-1],[1,1,0,0,0])` **ANS =**	4. $y[n] = 0$ for all n
	5. $y[n] = 3$ for all n
	6. $y[n] = \cos(2\pi n/3)$ for all n

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Prentice Hall, Upper Saddle River, NJ 07458.

SOLUTION

$$1 + e^{-j\hat{\omega}} + e^{-j2\hat{\omega}} = e^{-j\hat{\omega}}(e^{j\hat{\omega}} + 1 + e^{-j\hat{\omega}}) = e^{-j\hat{\omega}}(1 + 2\cos\hat{\omega})$$

Pick the correct output signal and enter the number in the answer box:

Difference Equation, or $h[n]$, and input

(a) $y[n] = x[n-1] - x[n-3]$ and

$x[n] = \delta[n-2]$

$y[n] = \delta[n-2-1] - \delta[n-2-3]$

$\boxed{\textbf{ANS} = 2}$

(b) $y[n] = \delta[n-1] * (\delta[n] - \delta[n-2])$

$\boxed{\textbf{ANS} = 1}$

$\delta[n-1] - \delta[n-1-2]$

(c) $y[n] = \sum_{k=0}^{2} x[n-k]$ and

$x[n] = 1 + \cos(2\pi n/3)$ for all n

$\boxed{\textbf{ANS} = 5}$

(d) `yy=conv([1,-1,1,-1],[1,1,0,0,0])`

$\boxed{\textbf{ANS} = 3}$

```
1  -1   1  -1
1   1
-------------------
1  -1   1  -1
    1  -1   1  -1
-------------------
1   0   0   0  -1
```

$\delta[n]$ $\qquad$ $-\delta[n-4]$

Output Signal

1. $y[n] = \delta[n-1] - \delta[n-3]$
2. $y[n] = \delta[n-3] - \delta[n-5]$
3. $y[n] = \delta[n] - \delta[n-4]$
4. $y[n] = 0$ for all n
5. $y[n] = 3$ for all n
6. $y[n] = \cos(2\pi n/3)$ for all n

Use Frequency Response

$\mathcal{H}(\hat{\omega}) = e^{-j\omega}(1 + 2\cos\hat{\omega})$

At $\hat{\omega} = 0$

$\mathcal{H}(\hat{\omega}) = e^{j0}(1+2) = 3$

At $\hat{\omega} = 2\pi/3$

$\mathcal{H}(\hat{\omega}) = e^{-j2\pi/3}(1 + 2\underbrace{\cos 2\pi/3}_{=-1/2})$

$= 0$

$\Rightarrow y[n] = 1 \cdot 3 + 0 \cdot \cos 2\pi n/3$

$= 3$

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