## Problem 5.9

Given filter coefficients are: $b_{k}=\{13,-13,13\}$ and $x[n]=0$, if n is even and $x[n]=1$, if n is odd.
Compute $y[n]$ by synthetic polynomial multiplication method:

| $\mathbf{n}$ | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{x}[\mathbf{n}]$ | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| $\mathbf{h}[\mathbf{n}]$ |  |  |  |  | 13 | -13 | 13 |  |  |  |
| $\mathbf{h}[\mathbf{0}] \mathbf{x}[\mathbf{n}]$ | 0 | 13 | 0 | 13 | 0 | 13 | 0 | 13 | 0 | 13 |
| $\mathbf{h}[\mathbf{1}] \mathbf{x}[\mathbf{n}-1]$ | -13 | 0 | -13 | 0 | -13 | 0 | -13 | 0 | -13 | 0 |
| $\mathbf{h}[\mathbf{2}] \mathbf{x}[\mathbf{n}-\mathbf{2}]$ | 0 | 13 | 0 | 13 | 0 | 13 | 0 | 13 | 0 | 13 |
| $\mathbf{y [ n ]}$ | -13 | 26 | -13 | 26 | -13 | 26 | -13 | 26 | -13 | $\mathbf{2 6}$ |

Hence, from the table, $y[n]=-13$, if n is even and $y[n]=26$ if n is odd.

