Q3).

→ <u>Case 1)</u>: Only additivity is obeyed.

Assume that $x_1[n] = 0 \ \forall n$ and $y_1[n] \neq 0 \ \forall n$.

Take $x_2[n] = 0 \ \forall n \Rightarrow y_2[n] = y_1[n] \ \forall n$

Since additivity is obeyed $\therefore$ when $x_3[n] = x_1[n] + x_2[n] = 0$
Then $y_3[n] = y_1[n] + y_2[n] = 2y_1[n]$.

$\therefore \ 2y_1[n] \neq y_1[n]$ when $y_1[n] \neq 0$

Hence $y_1[n] = 0 \ \forall n$.

<u>Case 2)</u>: Only homogeneity is obeyed.

Take $x_1[n] = 0 \ \forall n$

$x_2[n] = 2 \cdot x_1[n] \ \forall n$

$\Rightarrow y_2[n] = 2y_1[n] \ \forall n$

But $x_1[n] = x_2[n] \ \forall n$

$\therefore y_2[n] = y_1[n] \ \forall n$

$\Rightarrow 2y_1[n] = y_1[n] \ \forall n$

$\Rightarrow y_1[n] = 0 \ \forall n$.