Re: Solution to Fo4 Exam 3 Prob. 1(c)

$x[n]$ periodic of period 12, $y_2[n]$ periodic of period 9. The 
$\text{LCM}(12, 9) = 36$
so to answer this question we have to look at these 
sequences as being periodic of period 36. Note

$$36 = 12 \cdot 3 = 9 \cdot 4$$

Let $X_k$ denote the 12-periodic DFTS of $x[n]$ and 
let $Y_k$ denote the 9-periodic DFTS of $y[n]$.

Then using the result of Fo5 Exam 3 Prob 2(b) 
have

$$\tilde{X}_k = \begin{cases} 
X_{k/3} & \text{k a mult. of 3} \\
0 & \text{else} 
\end{cases} \quad k = 0, 1, 2, \ldots, 35$$

$$\tilde{Y}_k = \begin{cases} 
Y_{k/4} & \text{k a mult. of 4} \\
0 & \text{else} 
\end{cases} \quad k = 0, 1, 2, \ldots, 35$$

Then in order for there to be an LTI syst.
taking $x[n]$ to $y_2[n]$ we must have

$$\tilde{X}_k = 0 \implies \tilde{Y}_k = 0$$

But this does not work here. See plot of Matlab 
computation on following page.
Plot of $|\tilde{X}_{k+1}|$

Plot of $|\tilde{Y}_{k+1}|$

Requirement $\tilde{X}_k = 0 \Rightarrow \tilde{Y}_k = 0$ is violated here.