1(a). $R_Y[l] = R_X[l] * h[l] * h[-l]$

$\Rightarrow R_Y[l] = \frac{63}{16}\delta[l] - \frac{15}{8}\delta[l-1] + \frac{3}{4}\delta[l-2]$
$- \frac{15}{8}\delta[l+1] + \frac{3}{4}\delta[l+2]$

(b). $S_Y(e^{jw}) = \sum_{l=-\infty}^{\infty} R_Y[l] \cdot e^{-jwl}$

$= \frac{63}{16} - \frac{15}{8} \cdot e^{-jw} - \frac{15}{8} e^{jw}$
$+ \frac{3}{4} e^{2jw} + \frac{3}{4} e^{-2jw}$

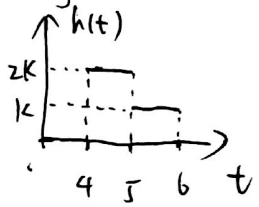
$= \frac{63}{16} - \frac{15}{8} \cdot 2\cos w + \frac{3}{4} 2 \cdot \cos 2w$

$= \frac{63}{16} - \frac{15}{4}\cos w + \frac{3}{2}\cos 2w$

2. (a) $h(t) = K \cdot S(t_1 - t)$

$= k \cdot S(6-t)$, k is any constant.

$\therefore h(t) = \begin{cases} 2k, & t \in [4,5] \\ k, & t \in [5,6] \end{cases}$



(b). $S(t) * h(t) = S_0(t)$

$t = 6$: $S_0(6) = 4K + K = 5K$.

(c). $R_{N_0}(t) = R_N(t) * h(t) * h(-t)$

$R_N(t) = N_0 \cdot \delta(t)$

$\Rightarrow R_{N_0}(t) = N_0 \cdot h(t) * h(-t)$

$\neq K \cdot \delta(t)$ ∴ the output is not white noise

↘ any constant