1. Solve the following problems from Oppenheim.
   a. 6-4
   b. 6-20
   c. 6-23
   d. 6-42

2. Consider the system shown in the Figure 1. The frequency response $H(\omega)$ of the ideal low-pass filter is given by [Figure 2]:

   
   $H(\omega) = T_s P_{\omega_c}(\omega) = \begin{cases} 
   T_s & |\omega| < \omega_c \\
   0 & \omega > \omega_c 
   \end{cases}$

   Show that if $\omega_c = \frac{\omega}{2}$, then for any choice of $T_s$,

   $y(mT_s) = x(mT_s)$  \( m = 0, \pm 1, \pm 2, \ldots \)

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Figure 1 (above)- Figure 2 (below)