1. Consider the signal whose Fourier transform is shown below. Let $x_s(t) = x(t)s(t)$ represent the sampled signal. Sketch $|X_s(\omega)|$ for the following cases.
   (a) $T = \pi/15$ sec.
   (b) $T = 2\pi/15$ sec.

2. Consider the signal whose Fourier transform is shown below. Let $x_s(t) = x(t)s(t)$ represent the sampled signal. Sketch $|X_s(\omega)|$ for the following cases.
   (a) $T = \pi/4$ sec.
   (b) $T = \pi/2$ sec.
   (c) $T = 2\pi/3$ sec.

3. Consider the sampling and reconstruction system shown below:

   The output $y(t)$ of the ideal reconstruction can be found by sending the sampled signal $x_s(t) = x(t)s(t)$ through an ideal lowpass filter with the frequency response function $H(w)$,
   
   $H(w) = \begin{cases} 
   T, & -0.5\omega_s \leq \omega < 0.5\omega_s, \\
   0, & \text{else}.
   \end{cases}$

   (a) Let $x(t) = 1 + \cos(15\pi t)$ and $T = 0.1$ sec. Sketch $|X_s(\omega)|$, where $x_s(t) = x(t)s(t)$. Determine the expression for $y(t)$.
   (b) Let $X(\omega) = 1/(j\omega + 1)$ and $T = 1$ sec. Sketch $|X_s(\omega)|$, where $x_s(t) = x(t)s(t)$. Does aliasing occur? (Justify your answer).