## Example

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1. The signal with spectrum $X(\omega) = |\omega| \operatorname{rect}\left(\frac{\omega}{2000\pi}\right)$ is sampled at a 800Hz sampling rate (using an ideal impulse train). Find an analytical expression for the spectrum $X_s(\omega)$ of the sampled signal $x_s(t) = x(t)p(t)$, and then carefully sketch $X_s(\omega)$.

2. Part of the original signal spectrum will be aliased. Specify the impulse response of an ideal filter that would extract the *unaliased* portion of the spectrum.

3. Determine the minimum sampling rate that would eliminate aliasing.

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This problem explores the effect of a mis-tuned AM receiver in the following analog communication system.
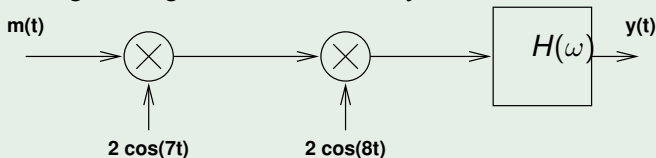


Assuming that $M(\omega) = \text{tri}(\omega/2)$ and $H(\omega) = \text{rect}(\omega/4)$, carefully draw the output spectrum $Y(\omega)$.

(Selected from Final Exam in Summer 2014.)