

Problem 21.1: The signal $x[n] = \begin{cases} 1, & |n| \leq N_1 \\ 0, & \text{else} \end{cases}$ has the Fourier transform $X(e^{j\omega}) = \frac{\sin(\omega(N_1+1/2))}{\sin(\omega/2)}$. Use this fact along with properties of Fourier transforms to find the Fourier transform of $g[n]$ shown in Figure 1. List each property you use at the time you use it.

Problem 21.2: A certain LTI system has impulse response $h[n] = (-1/3)^n u[n]$ and input $x[n] = (1/2)^{n-1} u[n-1]$. Use the convolution property of Fourier transforms (and possibly others) to determine the output signal $y[n]$.

Problem 21.3: Use tables of common signal-transform pairs and properties of the Fourier transform to determine the signal $x[n]$ whose Fourier transform is $X(e^{j\omega}) = \frac{e^{-j\omega}}{(1+\frac{1}{2}e^{-j\omega})^2}$.

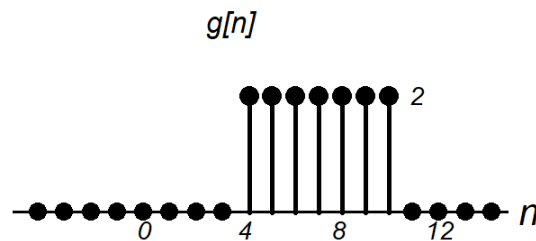


Figure 1

Optional, but testable problems: 5.24, 5.29.