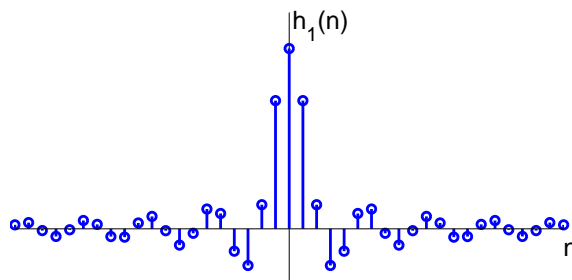


ECE-486 Spring 2008, April 4 Quiz

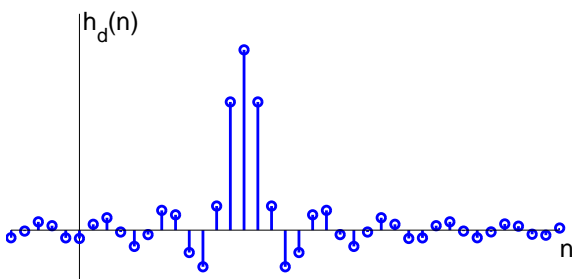
Name : _____

This quiz investigates the design of a 25-coefficient linear-phase, causal FIR lowpass filter with bandwidth $f_p = 0.07$ cycles/sample. The ideal transfer function and impulse response of the filter are given by

$$H_1(f) = \begin{cases} 1 & |f| < 0.07 \\ 0 & 0.7 < |f| < 0.5 \end{cases} \quad h_1(n) = \frac{\sin(2\pi(0.07)n)}{\pi n}$$



1. To create an (almost) causal 25-coefficient filter, the impulse response is delayed by 12 samples to create a “desired” impulse response as illustrated below. Write down the transfer function $H_d(f)$ associated with this delayed impulse response.



2. For numerical computation, a 1024-point DFT is to be used to manipulate the desired transfer function from part 1. Show how the DFT array $H_d(k)$ should be initialized. What is the value of $H_d(1023)$?