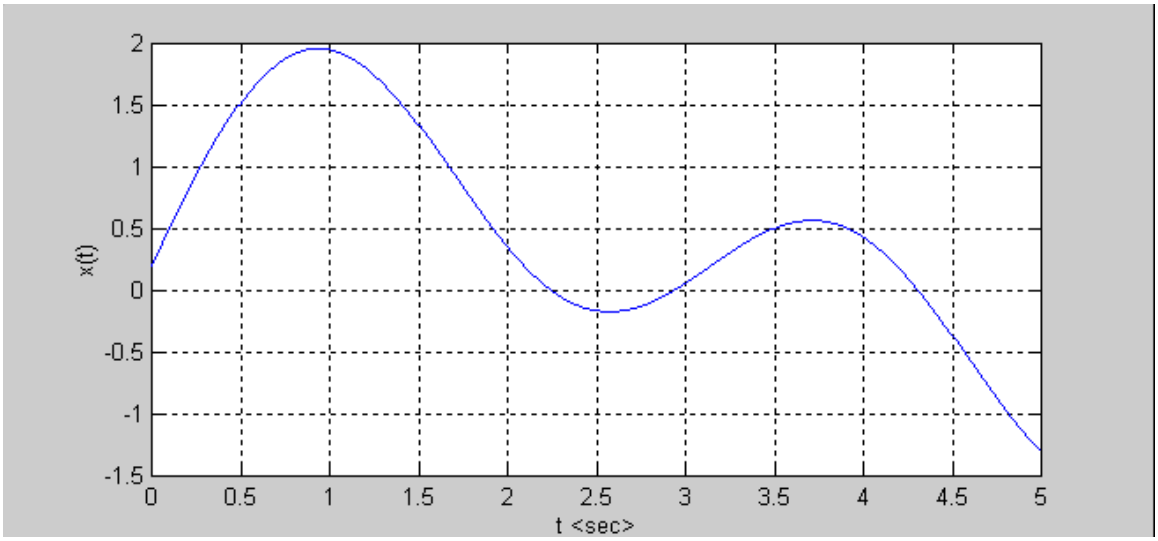
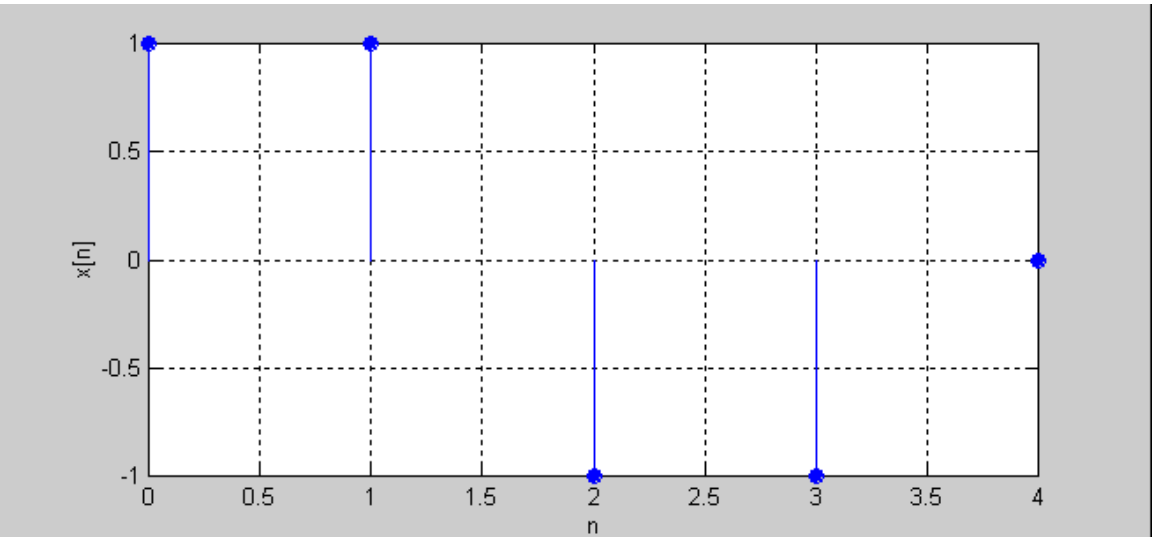
1. Consider the continuous-time signal shown.



a) Sample x(t) every T = 1 sec to get a discrete-time signal x[n]. Sketch x[n].
b) Reconstruct x(t) from x[n] in part **a** using the zero-order hold method. Sketch the zero-order hold approximation of x(t).
c) Sample x(t) every T = 0.5 sec to get a discrete-time signal x[n]. Sketch x[n].
d) Reconstruct x(t) from x[n] in part **c** using the zero-order hold method. Sketch the zero-order hold approximation of x(t).
e) For which sampling interval (period) T does the zero-order hold give a better approximation of x(t).

2. Consider the discrete-time signal shown below.



a) Write an expression for x[n] in terms of discrete-time pulses and/or discrete-time unit pulses.
b) Compute the DTFT $X(\Omega)$ of x[n] and plot its magnitude and phase spectra for $0 \leq \Omega \leq 2\pi$.
c) Compute the DFT X_k of x[n] numerically using the summation definition and plot its magnitude and phase spectra versus the frequency sample number k.
d) Superimpose the magnitude and phase spectra plots found in parts **b** and **c** converting the frequency sample number k over to discrete-time frequency so magnitude and phase spectra plots can use the same axes.