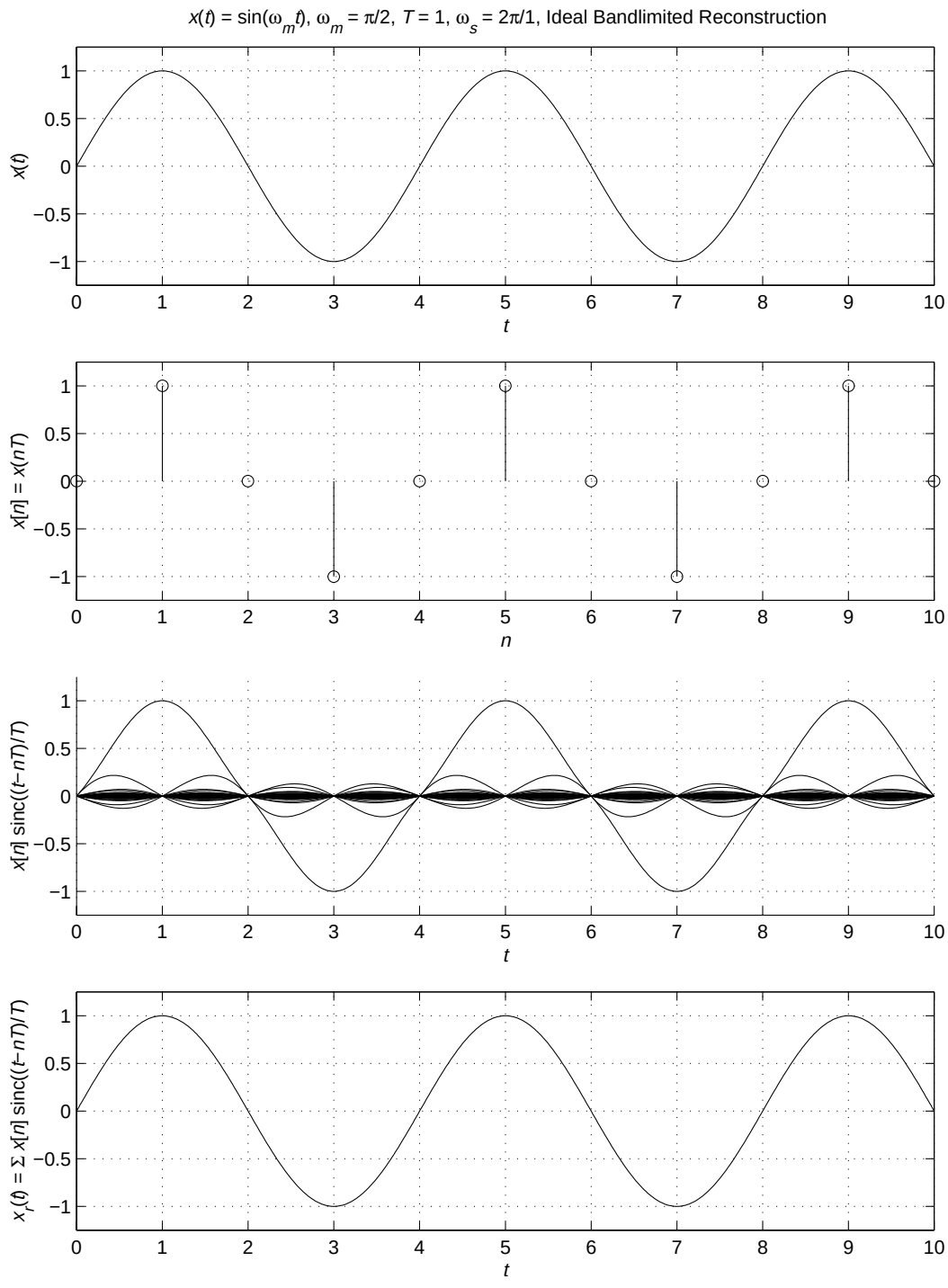
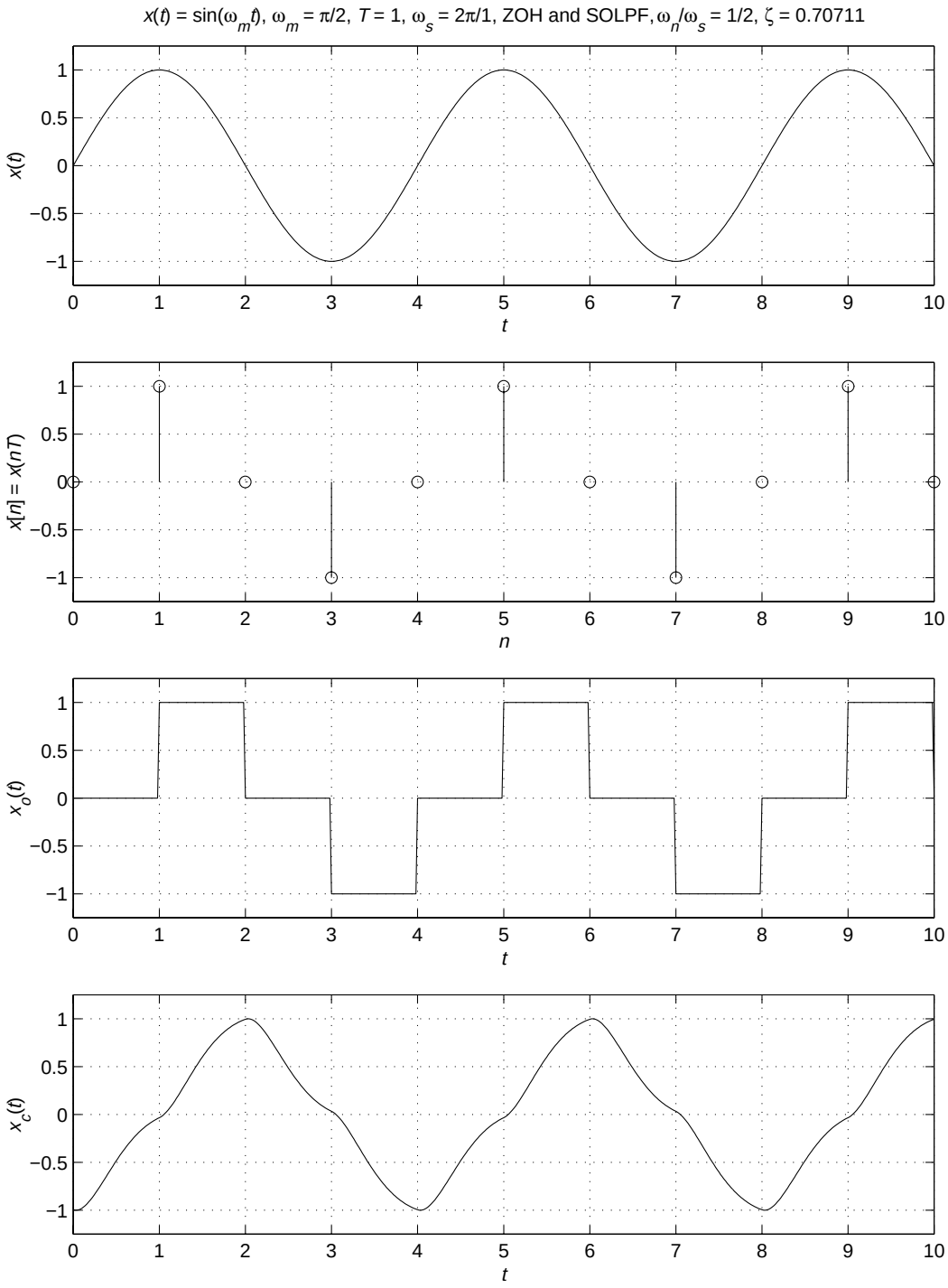
University of California at Berkeley
College of Engineering
Department of Electrical Engineering and Computer Sciences

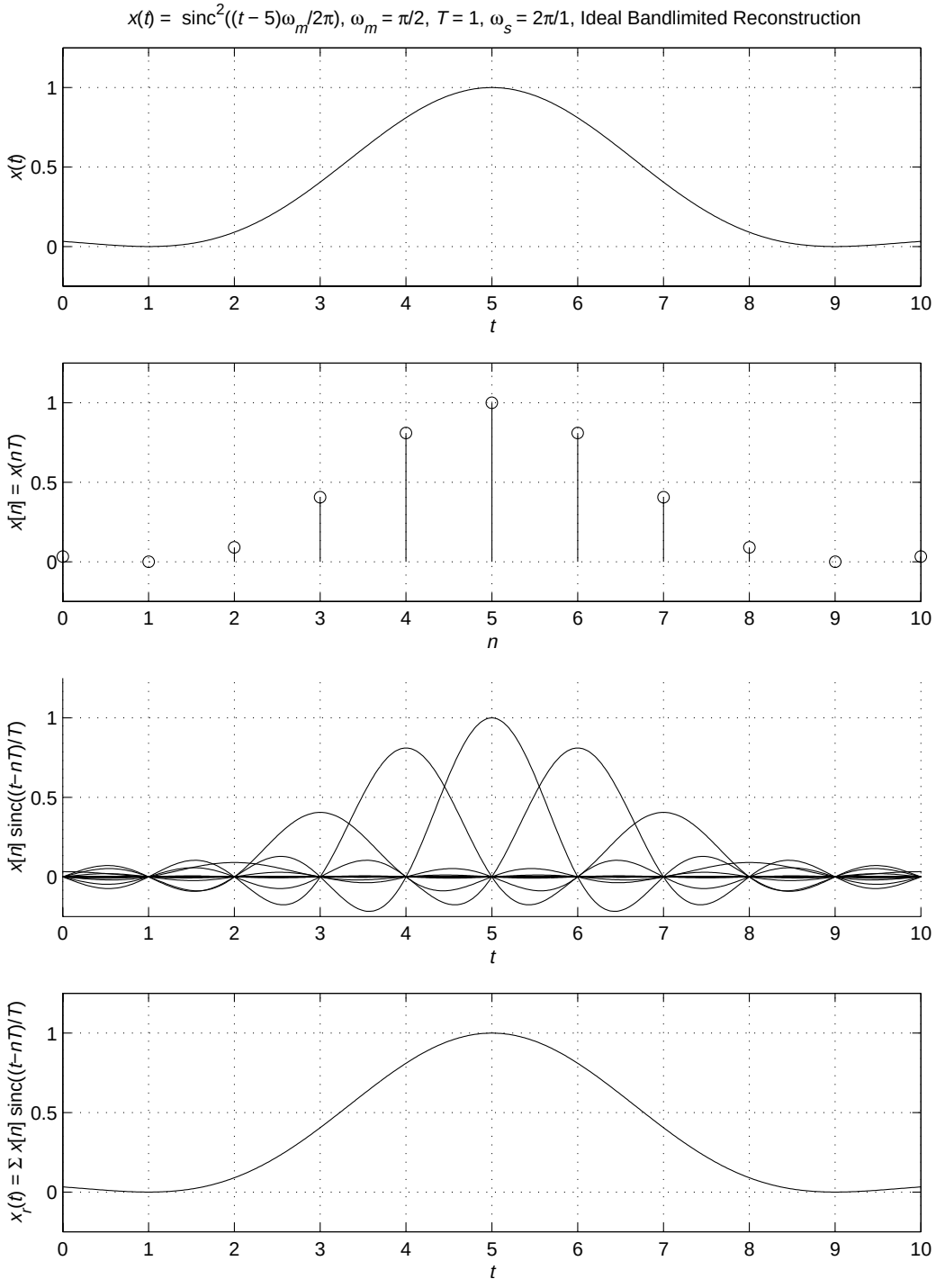
EECS 120: Signals and Systems
Fall Semester 1998

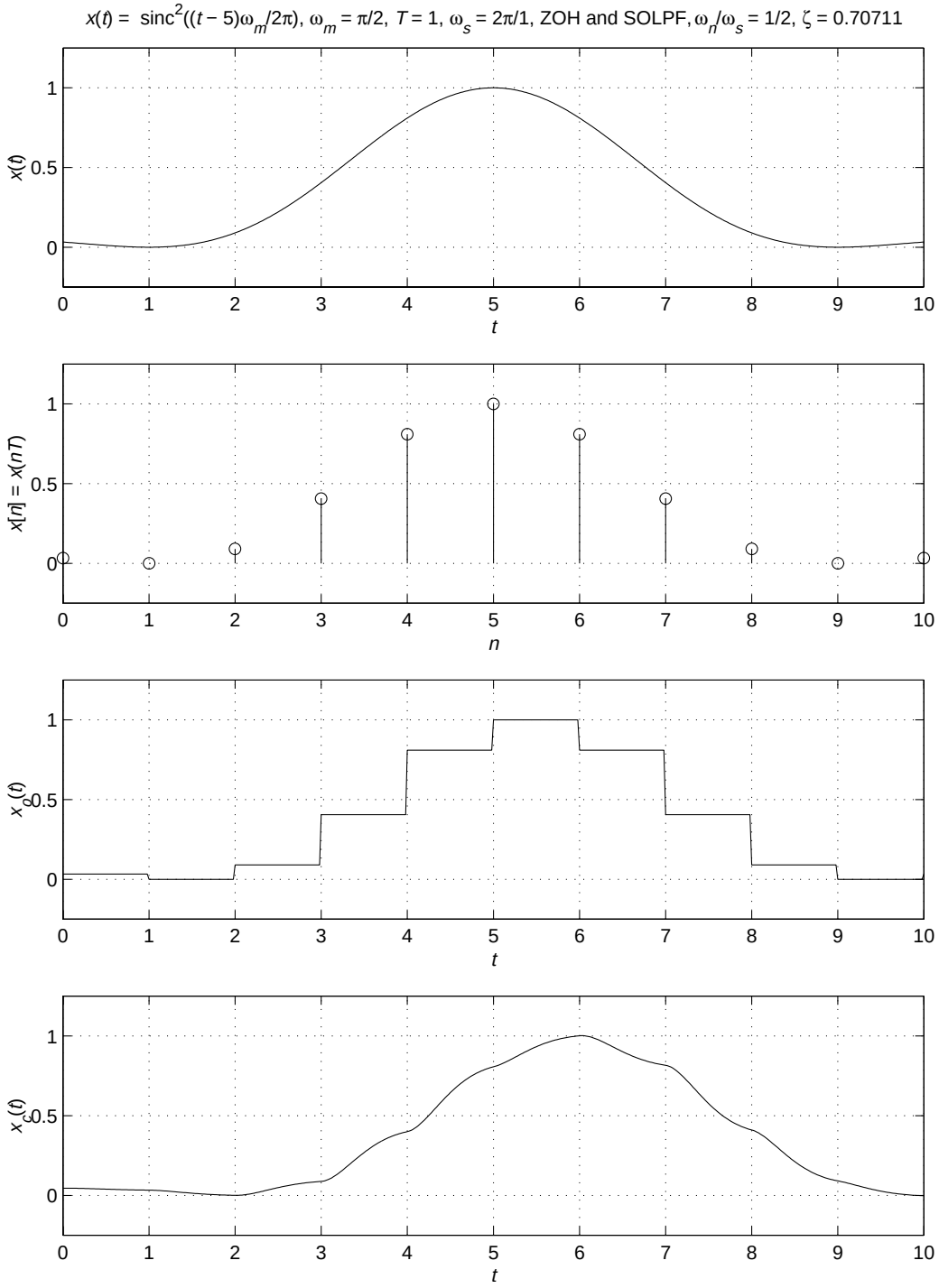
Examples of Sampling and Reconstruction

In both cases, $x(t)$ is bandlimited to $|\omega| \le \omega_m$ and $\omega_s = 4\omega_m$, i.e., we sample at twice the Nyquist rate. Reconstruction with zero-order hold uses a second-order lowpass filter with $\omega_n = \omega_s/2$ and $\zeta = 1/\sqrt{2}$.




x(t) = sin(ω_m t), ω_m = π/2, T = 1, ω_s = 2π/1, ZOH and SOLPF, ω_n/ω_s = 1/2, ζ = 0.70711
x(t)
t
x[n] = x(nT)
n
x_o(t)
t
x_c(t)
t


x(t) = sinc^2((t − 5)ω_m/2π), ω_m = π/2, T = 1, ω_s = 2π/1, Ideal Bandlimited Reconstruction
x(t)
t
x[n] = x(nT)
n
x[n] sinc((t−nT)/T)
t
x_r(t) = Σ x[n] sinc((t−nT)/T)
t


x(t) = sinc^2((t − 5)ω_m/2π), ω_m = π/2, T = 1, ω_s = 2π/1, ZOH and SOLPF, ω_n/ω_s = 1/2, ζ = 0.70711
x(t)
t
x[n] = x(nT)
n
x_o(t)
t
x_c(t)
t