

## HW#4

#1. Let  $x(t)$  be a signal with Nyquist rate  $w_0$ . Find the Nyquist rates of the following specifications:

(a)  $x(t)\cos(w_0t)$

(b)  $x(t) + x(t - 1)$

(c)  $\frac{dx(t)}{dt}$

(d)  $x^2(t)$

#2. Let  $|X(f)|$  be the magnitude spectrum of  $x(t)$ . Suppose  $|X(f)|=0$ , for  $f > f_m$ . Given the signal  $y(t) = x(t)[\cos(2\pi t) + \sin(10\pi t)]$ , determine the maximum value of  $f_m$ , for which  $x(t)$  can be reconstructed from  $y(t)$ .