UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
Department of Electrical and Computer Engineering

ECE 498MH Principles of Signal Analysis
Fall 2013

MIDTERM EXAM SOLUTIONS

Wednesday, October 1, 2013

Problem 1   (20 points)

$x = \frac{3}{2}, \quad y = \frac{\sqrt{3}}{2}$

Problem 2   (20 points)

$z(t) = \cos(2\pi 2000 t)$

Problem 3   (20 points)

$$X_k = \begin{cases} -\frac{1}{2} & k = 0 \\ \frac{1}{2} & k = 1, 2, 3 \end{cases}$$

Problem 4   (20 points)

For example, suppose $x_1[n] = \cos \pi n$; then $y_1[n] = \cos(\pi n)\cos(\omega_0 n)$. Let $x_2[n] = \cos \pi(n - 1)$; then $y_2[n] = \cos(\pi(n - 1))\cos(\omega_0 n) \neq y_1[n - 1]$.

Problem 5   (20 points)

$$y[n] = \begin{cases} 1 & n = 0 \\ -1 & n = 10 \\ 0 & \text{otherwise} \end{cases}$$