

EECS20n, Quiz 2, 03/08/04

The quiz will take 10 minutes. Write your response on the sheet. Put a box around your answer.

Please print your name and lab time here:

Last Name _____ First _____ Lab time _____

1. For each of the following definitions of a function $f : R^3 \rightarrow R$, determine whether it is linear (L) or non-linear (N).

(a) $\forall x, f(x) = 0$

(b) $\forall x, f(x) = 1$

(c) $\forall x = (x_1, x_2, x_3), f(x) = x_1 + 2x_2$

(d) $\forall x = (x_1, x_2, x_3), f(x) = x_1 + x_2 + 1$

(e) $\forall x = (x_1, x_2, x_3), f(x) = x_1^2$

2. Consider the three-dimensional SISO system whose $[A, b, c, d]$ representation is

$$A = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}, \quad b = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, \quad c^T = [1 \quad 2 \quad 3], \quad d = 1$$

- (a) Calculate $A^n, n \geq 0$.

- (b) Find the zero-state impulse response $h(n), n \geq 0$.