

ECE 592-100 – Signal Processing Tour of Quantum Computing

Quiz 1– Spring 2024

February 7, 2024

Please remember to justify your answers carefully.

Last name: _____ First name: _____

Question 1 (Orthogonality.)

Consider the row vector, $v_1 = [1 \ 2]$. Describe a second row vector, v_2 , which is nonzero and orthogonal to v_1 .

Question 2 (Diagonalizable matrices.)

Consider the matrix

$$A = \begin{bmatrix} 2 & 0 \\ 2 & 2 \end{bmatrix}.$$

Show that A is not diagonalizable.

Question 3 (Eigen values of matrix.)

Consider the following matrix,

$$A = \begin{bmatrix} 0 & 4 \\ 1 & 0 \end{bmatrix}.$$

(a) Compute the eigen values of A .

(b) Can A be a projection matrix? Make sure to justify your answer.

(c) Can A be a positive matrix? Make sure to justify your answer.