Quiz 8

Math 54-Lec 3, Linear Algebra, Fall 2017

SECTION: NAME:

You have 30 minutes to complete this quiz. To receive full credit, justify your answers.

Problem 1.(5 points) Let $A = \begin{bmatrix} 2 & 3 \\ 0 & 2 \end{bmatrix}$. Find the singular values of A. Hence, what is the maximum value of the quadratic form $Q(\vec{x}) = \vec{x}^T A^T A \vec{x}$ subject to the constraint that $\vec{x}$ is a unit vector?

Problem 2.(6 points) Consider the quadratic form: $Q(\vec{x}) = 2x_1^2 + 6x_1x_2 - 6x_2^2$. Find the matrix form of Q. That is, write $Q(\vec{x}) = \vec{x}^T A \vec{x}$ for some symmetric matrix A. Is Q positive definite, negative definite, or indefinite?

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Problem 3.(2 points each) Label the following statements true or false. If the statement is true, explain why. If it is false, explain why or provide a counterexample. Correct answers without justification will receive no credit.

(a.) Let A be an $n \times n$ orthogonally diagonalizable matrix. If A is invertible, then $A^{-1} = A^T$.

(b.) The expression $||x||^2$ is quadratic form.