

Name: _____
Student ID #: _____

Mini-Quiz # 4
MAT-022A-Summer Session II (8/7/09)

You have 10 minutes. You may only use a pencil (or pen) and scrap paper. No calculators, notes or books.

1. For the following proposed questions write a linear system in augmented form which could be solved to answer the question. You do not have to solve the system and you do not need to explain your answer. (2 points each).

(a) For $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 0 & 0 \\ 5 & 1 & 4 \end{bmatrix}$ let $f : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be the linear transformation whose image

$f(u) = A^T u$ for all $u \in \mathbb{R}^3$. Is $\begin{bmatrix} 1 \\ -4 \\ \pi^2 \end{bmatrix}$ in the range of f ?

(b) Is $\begin{bmatrix} 4 \\ 7 \\ 2 \\ 1 \end{bmatrix}$ a linear combination of the vectors $\begin{bmatrix} 3 \\ 1 \\ \sqrt{2} \\ 1 \end{bmatrix}$, $\begin{bmatrix} \pi \\ 7 \\ -2 \\ \frac{1}{2} \end{bmatrix}$, and $\begin{bmatrix} 0 \\ 1 \\ 1 \\ 0 \end{bmatrix}$?

2. Carefully using algebraic properties show the following. (3 points each)

(a) Let A be an $n \times n$ matrix. Show that AA^T is a symmetric matrix.

(b) Let x_h be a solution to the homogeneous system $Ax = 0$ and let x_p be a solution to the linear system $Ax = b$. Show that $x_h + x_p$ is a solution to the system $Ax = b$.