MATH 2270

Quiz #3 - Fall 2008

Name: ____

1. (3 points) If possible, compute the following matrix products. If the matrix product is undefined, write *undefined*.

   (a) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{pmatrix} \begin{pmatrix} a & c \\ b & d \end{pmatrix} =$

   (b) $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \end{pmatrix} =$

   (c) $\begin{pmatrix} 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} a & d & g \\ b & e & h \\ c & f & k \end{pmatrix} \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} =$

2. (4 points) Consider the matrix

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}.$$

Find *two* vectors in $\mathbb{R}^3$ that span $\ker(A)$. Clearly indicate your answer.

3. (4 points) True or false. Indicate whether the following statements are true or false.

(a) If A is the matrix

$$A = \begin{pmatrix} a & b \\ c & d \\ e & f \end{pmatrix}$$

then $\ker(A)$ is a subset of $\mathbb{R}^2$.

(b) If A is the matrix above, then $\mathrm{im}(A)$ is a subset of $\mathbb{R}^2$.

(c) If A and B are two $n \times n$ matrices, then it is always the case that

$$(A - B)(A + B) = A^2 - B^2$$

(d) If A is an invertible $n \times n$ matrix, then it is always the case that

$$(I_n + A)(I_n + A^{-1}) = 2I_n + A + A^{-1}$$