

# Take-Home Quiz 4

(Due at 7:00 p.m. on Fri. October 5, 2007)

Division:

ID#:

Name:

(This quiz is designed to give you hints to read an article titled “The Reduced Row Echelon Form of a Matrix Is Unique: A Simple Proof,” handed out at the second lecture.)

1. Express, if possible, the matrix below as a product of elementary matrices, if not, explain the reason. (If you apply a theorem, clarify which part is used.)

$$\begin{bmatrix} 1 & 2 & 4 \\ 2 & 3 & 7 \\ 3 & 3 & 9 \end{bmatrix}$$

2. We want to show “the reduced row echelon form of a matrix is unique.” Let  $A$  be an  $m \times n$  matrix and let both  $B$  and  $C$  be reduced row echelon form of  $A$ . Since  $B$  and  $C$  are obtained by performing a series to elementary row operations to  $A$ , there are invertible matrices  $P$  and  $Q$  such that  $B = PA$  and  $C = QA$ .

- (a) Let  $\mathbf{x}$  be an  $n \times 1$  matrix. Show that  $A\mathbf{x} = \mathbf{0} \Leftrightarrow B\mathbf{x} = \mathbf{0}$ , where  $\mathbf{0}$  is the zero matrix of size  $n \times 1$ .

- (b) Let  $\mathbf{x}$  be an  $n \times 1$  matrix. Show that if  $A\mathbf{x} = \mathbf{0}$ , then  $(B - C)\mathbf{x} = \mathbf{0}$ .

Message 欄：あなたにとって、豊かな生活とはどのようなものでしょうか。どのようなとき幸せだと感じますか。[HP 掲載不可は明記のこと]