2018 Fall EECS205002 Linear Algebra

Name: ID:

2018/10/15 Quiz 2

1. Consider a 3×3 matrix A. If $I = E_1(2,3)E_2(2,9)E_3(3,1,-2)A$,
   (a) What is A?
   (b) Is A singular? Justify your answer.

2. An upper triangular matrix A has element $a_{ij} = 0$ for $i > j$. Show that

   (a) A is nonsingular if and only if all diagonal elements a_{ii} are nonzero. (Hint: using determinant.)

   (b) If A is nonsingular, A^{-1} must be also upper triangular. (Hint: using induction.)

   (c) (*) sketch of the proof. (1) For 1x1 matrix, it is trivial. (2) For any $n \geq 2$, A can be expressed as

$$A = \begin{bmatrix} A_{11} & A_{12} \\ 0 & A_{22} \end{bmatrix},$$