Name: ID #: Section #:

(**1**) Let $\mathbf{A}$ be a nonzero 3×6 matrix.

(a) What is the ***maximum rank*** that $\mathbf{A}$ can have?

(b) If $\text{rank}(\mathbf{A}|\mathbf{B}) = 2$, then for what value(s) of $\text{rank}(\mathbf{A})$ is the system $\mathbf{AX} = \mathbf{B},\ \mathbf{B} \neq \mathbf{0}$, ***consistent***? ***Inconsistent***?

(**2**) Consider the matrix

$$\mathbf{C} = \begin{pmatrix} 1 & 2 & 1 \\ 0 & 2 & 1 \\ 0 & 1 & 2 \end{pmatrix}.$$

(a) Find the ***eigenvalues*** of $\mathbf{C}$. What are the eigenvalues of $\mathbf{C}^{-1}$?

(b) Find an ***eigenvector*** corresponding to the ***largest*** eigenvalue of $\mathbf{C}$.

(c) Find $\mathbf{C}^{-1}$.

Name: ID #: Section #:

(**1**) Let $\mathbf{A}$ be a nonzero 4×7 matrix.

(a) What is the ***maximum rank*** that $\mathbf{A}$ can have?

(b) If $\text{rank}(\mathbf{A}|\mathbf{B}) = 3$, then for what value(s) of $\text{rank}(\mathbf{A})$ is the system $\mathbf{AX} = \mathbf{B},\ \mathbf{B} \neq \mathbf{0}$, ***consistent***? ***Inconsistent***?

(**2**) Consider the matrix

$$\mathbf{C} = \begin{pmatrix} -1 & 2 & 1 \\ 0 & -2 & -1 \\ 0 & -1 & -2 \end{pmatrix}.$$

(a) Find the ***eigenvalues*** of $\mathbf{C}$. What are the eigenvalues of $\mathbf{C}^{-1}$?

(b) Find an ***eigenvector*** corresponding to the ***largest*** eigenvalue of $\mathbf{C}$.

(c) Find $\mathbf{C}^{-1}$.