Math 207 Section A, Quiz 7   Name: _____

Cheating will not be tolerated. If there is any indication that a student gave or received unauthorized aid on this test, the case will be referred to the ISU Office of Judicial Affairs.

"On my honor as a student I, _____, have neither given nor received unauthorized aid on this quiz."   (print name clearly)

           Signature: _____ Date: _____

Multiple choice section. Circle the letter next to the correct answer(s). A question may have more than one correct answer. *Select all that apply.*

1. The **rank** of an $m \times n$ matrix A is equal to

    (a) the row space of A.

    (b) the dimension of the row space A.

    (c) the dimension of the column space of A.

    (d) $n - \text{nullity}(A)$.

    (e) dimension of the solution space of $A\mathbf{x} = \mathbf{0}$.

    (f) the relative position of A in the matrix army.

2. If A and B are **row equivalent** matrices then

    (a) B can be derived from A using elementary row operations.

    (b) A and B must have the same number of nonzero rows.

    (c) the row space of A must equal the row space of B.

    (d) the column space of A must equal the column space of B.

    (e) the rank of A must equal the rank of B.

    (f) A and B must row boats up river at equivalent rates.

3. The **nullity** of an $m \times n$ matrix A is equal to

    (a) the row space of A.

    (b) the dimension of the row space A.

    (c) the dimension of the column space of A.

    (d) $n - \text{rank}(A)$.

    (e) dimension of the solution space of $A\mathbf{x} = \mathbf{0}$.

    (f) the illegal marriage of A to another matrix of the same dimensions.

4. Consider the following **row equivalent** matrices:

$$A = \begin{bmatrix} -2 & -5 & 8 & 0 & -17 \\ 1 & 3 & -5 & 1 & 5 \\ -1 & -1 & 1 & 3 & -19 \\ 1 & 7 & -13 & 5 & -3 \end{bmatrix}, \qquad B = \begin{bmatrix} 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & -2 & 0 & 3 \\ 0 & 0 & 0 & 1 & -5 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}.$$

a. Determine the *rank* and *nullity* of A.

$\text{rank}(A) =$ \qquad\qquad $\text{nullity}(A) =$

b. Find a basis for the *nullspace* of A.

c. Find a basis for the *row space* of A. (Use vectors appearing in matrices above!)

d. Find a basis for the *column space* of A. (Use vectors appearing in matrices above!)

e. The rows of A are linearly

(a) dependent \qquad\qquad (b) independent \qquad\qquad (c) libertarian

(circle the letter next to the correct answer)