

Last name _____

First name _____

LARSON—MATH 310—CLASSROOM WORKSHEET 09
Matrix Multiplication

Review

- What is the dot product definition of matrix multiplication?
- Matrix multiplication is not commutative.
- What is the *identity matrix*?
- What is the *inverse* of a (square) matrix?

1. Find:

$$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

2. Find a matrix D' that “reverses” what multiplication by D does. Check that D and D' are inverses.

3. Let $A = \begin{bmatrix} 2 & 0 \\ 1 & 0 \end{bmatrix}$. Find A^{-1} if it exists. Check.

4. Let $B = \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}$. Find B^{-1} if it exists. Check.

Let $C = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$. Find C^{-1} if it exists. Check.

5. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 0 \\ 0 & 5 & 6 \end{bmatrix}$. Find A^{-1} .

6. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 0 \\ 0 & 2 & 12 \end{bmatrix}$. Show that A is not invertible.

7. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 0 \\ 0 & 5 & 6 \end{bmatrix}$. Find A^{-1} .

8. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 0 \\ 0 & 2 & 12 \end{bmatrix}$. Show that A is not invertible.

Fact: The product of lower-triangular matrices is lower-triangular.

9. Let $L_1 = \begin{bmatrix} 1 & 0 \\ 2 & 3 \end{bmatrix}$ and $L_2 = \begin{bmatrix} 4 & 0 \\ 5 & 6 \end{bmatrix}$. Find L_1L_2 and check that it is lower-triangular.