

Week in Review—Additional Chapter 5 Material

1. (a) $\begin{bmatrix} 11 & 31 \\ -4 & 43 \end{bmatrix}$

(b) not possible since B has 3 columns and D has only two rows.

(c) $\begin{bmatrix} 9x - 1 & 3x + 2 & 8 \\ 13 & 16 & 40 \end{bmatrix}$

(d) $\begin{bmatrix} x^2 + 2 & x + 5 \\ 2x + 10 & 27 \end{bmatrix}$

(e) $\begin{bmatrix} 2 & 8 & 16 \\ 4 & 6 & 0 \\ 0 & 2 & 10 \end{bmatrix}$

(f) not possible.

2. (a) The numbers in the matrix LM do not represent any usable information.

The first number in the matrix LM is found by the computation $9 \cdot 30 + 4 \cdot 7$. The 9 is the number of ounces of Food I and 30 is the number of units of vitamin A in each ounce of Food I giving a result of 270 which is the number of units of Vitamin A eaten for lunch. The 4 is the number of ounces of Food II and the 7 is the number of units of vitamin C in each ounce of Food I giving a result of 28 which has no meaning whatsoever.

(b) The numbers in MB^T are the number of units of Vitamin A (330) and Vitamin C (125) eaten at breakfast.

3. $\begin{bmatrix} 0.4 & -0.2 \\ -1 & 1 \end{bmatrix}$

4. $\begin{bmatrix} 3 & -1 & -1 \\ -4 & 2 & 1 \\ -1 & 0 & 1 \end{bmatrix}$

5. no inverse exists.

6. yes. If you compute AB or BA you get the identity matrix.

7. (a) $\begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & -1 \\ 3 & 1 & -1 \end{bmatrix}$

(b) $\begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & -1 \\ 3 & 1 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix}$

(c) $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & -1 \\ 3 & 1 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix}$ and

$$X = A^{-1}B = \begin{bmatrix} 3 \\ -9 \\ -4 \end{bmatrix}$$

Answer: $x = 3$, $y = -9$, and $z = -4$

8. This statement is false. The system of equations given below has a coefficient matrix that is not square. Thus the equation $AX = B$ can not be solved by matrix inverses. The system of equations does have a solution and it can be found using rref.

$$2x + z = 2$$

$$2x + y - z = 1$$

$$3x + y - z = 4$$

$$7x + 2y + z = 7$$

9. (a) $X = (B + C)^{-1} * E$

(b) $X = K * (J + A)^{-1}$