

Homework - June 18

Section 1.10 and Section 2.1

Section 1.10

4. The vector equation is $x_1 \begin{bmatrix} 10 \\ 50 \\ 30 \end{bmatrix} + x_2 \begin{bmatrix} 20 \\ 40 \\ 10 \end{bmatrix} + x_3 \begin{bmatrix} 20 \\ 10 \\ 40 \end{bmatrix} = \begin{bmatrix} 100 \\ 300 \\ 200 \end{bmatrix}$. The variables

represent units of food for each of the 3 foods.

$$\begin{bmatrix} 10 & 20 & 20 & 100 \\ 50 & 40 & 10 & 300 \\ 30 & 10 & 40 & 200 \end{bmatrix} \sim \begin{bmatrix} 1 & 2 & 2 & 10 \\ 5 & 4 & 1 & 30 \\ 3 & 1 & 4 & 20 \end{bmatrix} \sim \begin{bmatrix} 1 & 2 & 2 & 10 \\ 0 & -6 & -9 & -20 \\ 0 & -5 & -2 & -10 \end{bmatrix} \sim \begin{bmatrix} 1 & 2 & 2 & 10 \\ 0 & 1 & 3/2 & 10/3 \\ 0 & 0 & 11/2 & 20/3 \end{bmatrix} \sim \begin{bmatrix} 1 & 2 & 0 & 250/33 \\ 0 & 1 & 0 & 50/33 \\ 0 & 0 & 1 & 40/33 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & 0 & 150/33 \\ 0 & 1 & 0 & 50/33 \\ 0 & 0 & 1 & 40/33 \end{bmatrix}. \text{ The solution is } \mathbf{x} = \begin{bmatrix} 150/33 \\ 50/33 \\ 40/33 \end{bmatrix}.$$

Section 2.1

8. If BC is 3×4 , then B has 3 rows.

16. a) False. $AB = [A\mathbf{b}_1 \quad A\mathbf{b}_2 \quad A\mathbf{b}_3]$.

b) True.

c) False. $(AB)C = A(BC)$.

d) False. $(AB)^T = B^T A^T$.

e) True.

22. If the columns of B are linearly dependent, there exists a nonzero \mathbf{x} that is a solution to $x_1 \mathbf{b}_1 + \cdots + x_p \mathbf{b}_p = \mathbf{0}$.

This \mathbf{x} is also a solution to $x_1 A\mathbf{b}_1 + \cdots + x_p A\mathbf{b}_p = \mathbf{0}$ by a property of matrix multiplication. (You can pull the A to the front.)