Sample Test Questions
(Barnett, Ziegler, and Byleen)

Chapter 6  Systems of Equations and Inequalities

6-1 systems of linear equations and augmented matrices

1. Solve the following systems of linear equations by graphing. If there is no unique solution, then so state and explain.

   a. \[\begin{align*}
   2x - 3y &= 2 \\
   x + 2y &= 8
   \end{align*}\]  

   b. \[\begin{align*}
   2x - 3y &= 2 \\
   -4x + 6y &= -4
   \end{align*}\]

2. Solve the following systems of linear equations by substitution. If there is no unique solution, then so state and explain.

   a. \[\begin{align*}
   2x - 3y &= 2 \\
   x + 2y &= 8
   \end{align*}\]

   b. \[\begin{align*}
   2x - 3y &= 2 \\
   -4x + 6y &= 8
   \end{align*}\]

6-2 gauss-jordan elimination

3. Transform the following system of equations into the augmented matrix form.

   \[\begin{align*}
   3x + 5y + z &= 6 \\
   6x + 7y - 2z &= 2 \\
   2x - 5y + 3z &= 4
   \end{align*}\]

4. In solving a system of simultaneous linear equations by Gaussian elimination, the following is encountered. What do you do to proceed, ir if you cannot proceed, what does each mean?

   a. \[
   \begin{bmatrix}
   1 & 2 & 1 & | & 1 \\
   0 & 0 & 4 & | & 7 \\
   0 & 1 & 2 & | & 6
   \end{bmatrix}
   \]

   b. \[
   \begin{bmatrix}
   1 & 3 & 4 & | & 1 \\
   0 & 1 & 2 & | & 7 \\
   0 & 0 & 0 & | & 3
   \end{bmatrix}
   \]
5. Solve the following systems by Gaussian elimination. If there is no unique solution, then so state and explain.

\[
\begin{align*}
3x + 5y - z &= -7 \\
x + y + z &= -1 \\
2x + 11z &= 7 \\
4x - 2y - z &= -3
\end{align*}
\]

a. \[
\begin{align*}
3x + 5y &= 6 \\
6x + 10y &= 2
\end{align*}
\]

b. \[
\begin{align*}
x + y + z &= 6 \\
y - z &= -1
\end{align*}
\]

6. Solve the following systems by any method you wish. If there is no unique solution, then so state and explain.

\[
\begin{align*}
3x + 5y &= 6 \\
6x + 10y &= 2 \\
3x + 5y &= 6 \\
6x - 10y &= 3 \\
2x + 5y - z &= 12 \\
x - 2y + 4z &= -12 \\
3x + 7z &= -15
\end{align*}
\]

7. A dietician in a hospital is to make up a special diet using three basic foods. The diet is to include exactly 340 units of calcium, 180 units of iron, and 220 units of vitamin A. The number of units per ounce of each special ingredient for each of the foods is listed in the table.

<table>
<thead>
<tr>
<th>units per ounce</th>
<th>Food A</th>
<th>Food B</th>
<th>Food C</th>
</tr>
</thead>
<tbody>
<tr>
<td>calcium</td>
<td>30</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>iron</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>vitamin A</td>
<td>10</td>
<td>30</td>
<td>20</td>
</tr>
</tbody>
</table>

How many ounces of each food must be used to meet diet requirements?