1) Create a matrix solution to the following system: (25 points)

\[
\begin{align*}
3x + 4y - z &= 29 \\
-2x + 3y + 6z &= -7 \\
4x - 5y - 8z &= 7
\end{align*}
\]

Write in matrix form:

With the help of the TI-83/84 find the inverse matrix and re-write the system in matrix form using this inverse matrix. Remember to use the 1:►Frac key, if necessary, in finding the inverse. Be sure to show all necessary steps.

Again with the help of the TI-83 complete the solution.

\[
\begin{align*}
x &= \text{__________} & y &= \text{__________} & z &= \text{__________}
\end{align*}
\]
2) Consider the following tables: (15 points)

**TABLE A**
Taxable Sales for the Month of *June*
(Sales in Thousands of Dollars)

<table>
<thead>
<tr>
<th></th>
<th>Waldorf</th>
<th>LaPlata</th>
<th>Lexington Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant</td>
<td>120</td>
<td>85</td>
<td>92</td>
</tr>
<tr>
<td>Safeway</td>
<td>200</td>
<td>80</td>
<td>105</td>
</tr>
<tr>
<td>Food Lion</td>
<td>63</td>
<td>32</td>
<td>81</td>
</tr>
</tbody>
</table>

**TABLE B**
Taxable Sales for the Month of *July*
(Sales in Thousands of Dollars)

<table>
<thead>
<tr>
<th></th>
<th>Waldorf</th>
<th>LaPlata</th>
<th>Lexington Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant</td>
<td>130</td>
<td>90</td>
<td>85</td>
</tr>
<tr>
<td>Safeway</td>
<td>185</td>
<td>90</td>
<td>110</td>
</tr>
<tr>
<td>Food Lion</td>
<td>60</td>
<td>38</td>
<td>75</td>
</tr>
</tbody>
</table>

Enter Table A as matrix \([A]\) and Table B as matrix \([B]\).

Suppose you are a State of Maryland employee who has been assigned the task of writing a report for the nine grocery stores in the Southern Maryland area listed in Tables A and B. Among other things, your report is to contain tables that show all of the following:

a) Write a matrix to show the combined sales for June and July.
   The combine sales for the Food Lion at LaPlata was ________________________.

b) Write a matrix to show the change in sales for June and July.
   What was the change in sales at the Giant in Waldorf? ________________________.

c) Write a matrix to show the total tax collected at each store for the combined sales of the months of June and July.
   What was the amount of tax collected at Safeway in Lexington Park? _______________
3) Last year, farmer Ed planted 3 different varieties of corn, varieties A, B, and C. His harvest from all three varieties combined was 22,700 bushels. Ed also planted a total of 100 acres of corn on his farm. He kept a log of the time that was spent on this project and it came to 194 hours. Each variety requires a different amount of labor to bring it to harvest and each variety also yields a different number of bushels per acre when harvested. These facts are summarized in the table below:

<table>
<thead>
<tr>
<th></th>
<th>Hours of labor per acre</th>
<th>Bushels per acre harvested</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3</td>
<td>400</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>200</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>100</td>
</tr>
</tbody>
</table>

Determine the number of acres that Ed planted in each type of corn and the number of bushels that he harvested of each type. (30 points)

Establish your variables precisely:

Write the system of equations:

Rewrite the system in matrix form:

Now rewrite the system using the inverse matrix:

The solution is:

<table>
<thead>
<tr>
<th></th>
<th>Acres</th>
<th>Bushels</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>B</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>C</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td></td>
<td>B-9</td>
<td></td>
</tr>
</tbody>
</table>
4) The following is the system of constraints to some linear programming problem:

\[
\begin{align*}
40x + 10y &\geq 2400 \\
10x + 15y &\geq 2100 \\
5x + 15y &\geq 1500 \\
x &\geq 0, \quad y &\geq 0
\end{align*}
\]

Minimize the objective function: \( C = 6x + 8y \)

a) Find the x and y-intercept of each equation.

b) Determine the values that you are using in your WINDOW on the TI-83/84.

\[
\begin{align*}
\text{Xmin} &= \ldots \\
\text{Ymin} &= \ldots \\
\text{Xmax} &= \ldots \\
\text{Ymax} &= \ldots \\
\text{Xscl} &= \ldots \\
\text{Yscl} &= \ldots
\end{align*}
\]

c) Using the calculator, graph and label each line, identify the feasible region in a sketch below using the information of part b.

d) Identify the coordinates of all four corner points and determine the value of the objective function. Write a complete sentence in which you summarize your findings.