Math 1090 – Business Algebra

Section 2.3 Gauss-Jordan Elimination

Objectives:
- Set up an Augmented Matrix to represent a system of linear equations.
- Perform elementary row operations to a matrix.
- Manipulate the matrix to provide a solution to the system of linear equations.
- Recognize when there is more than one solution or none at all.

Vocabulary

**Augmented Matrix**: A matrix that represents a system of linear equations.

**Elementary Row Operations**:  
1. Switch two rows.

2. Multiply a row by a nonzero constant.

3. Replace one row with the result of adding it to a nonzero multiple of another row.

**Gauss-Jordan Elimination**: A process for solving a system of linear equations, using elementary row operations until we have a triangular matrix like this:

\[
\begin{bmatrix}
1 & 3 & 4 & : & 5 \\
0 & 1 & 2 & : & 7 \\
0 & 0 & 1 & : & -4 \\
\end{bmatrix}
\]
Ex 1: Solve. \[\begin{align*}
2x - y &= 3 \\
x + z &= 3 \\
2x - y + z &= 2
\end{align*}\]

Ex 2: Solve. \[\begin{align*}
-2x + y &= 1 \\
2x - y &= 7
\end{align*}\]
Ex 3: Solve. \[10x + y = 6\]
\[3x + y + 2z = 3\]
\[2x - y - 2z = 2\]

Ex 4: Solve. \[3x - 2y - 7z = 0\]
\[x - y - z = 1\]
\[-x + 2y - 3z = -4\]
Ex 5: Solve.

\[ x + y + z = 1 \]
\[ x - y - z = 1 \]
\[ -x + y - z = 1 \]