MATH 3511 Bennethum

Supplemental Linear Algebra Homework Problems

These are homework problems involving solving systems of linear equations. The exact assignment (which problems are due when) will be announced in class.

1. Each matrix below represents the augmented matrix for a system of linear equations. Gauss elimination has already been performed on these matrices. Finish solving the system of equations completely.

   (a) $\left[\begin{array}{ccc|c} 1 & 2 & -4 & 2 \\ 0 & 1 & -2 & -1 \\ 0 & 0 & 1 & 2 \end{array}\right]$

   (b) $\left[\begin{array}{cccc|c} 1 & 0 & 4 & 7 & 10 \\ 0 & 1 & -3 & -4 & -2 \\ 0 & 0 & 1 & 1 & 2 \end{array}\right]$

   (c) $\left[\begin{array}{ccc|c} 1 & 2 & 2 & 2 \\ 0 & 1 & 3 & 3 \\ 0 & 0 & 0 & 1 \end{array}\right]$

2. Solve using Gauss elimination.

   (a)

   $$\begin{aligned} x_1 + x_2 + 2x_3 &= 8 \\ -x_1 - 2x_2 + 3x_3 &= 1 \\ 3x_1 - 7x_2 + 4x_3 &= 10 \end{aligned}$$

   (b)

   $$\begin{aligned} 5x + 2y + 6z &= 0 \\ -2x + y + 3z &= 0 \\ 3x + 3y + 9z &= 0 \end{aligned}$$

   (c)

   $$\begin{aligned} x_1 - 2x_2 + x_3 - 4x_4 &= 1 \\ x_1 + 3x_2 + 7x_3 + 2x_4 &= 2 \\ x_1 - 12x_2 - 11x_3 - 16x_4 &= 5 \end{aligned}$$

Solutions

1a) Unique solution - check by substiting back into the equivalent system of equations.
1b) Infinite number of solutions. Check by substituting back into the equivalent system of equations.
1c) Inconsistent.