

MA 162: Finite Mathematics - Section 2.3

Fall 2014

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Announcements:

- Alternate Exam Request Form due Today.
- Homework 2.2 due Tuesday at 6pm.
- Homework 2.3 due Friday at 6pm.

2.2 Review - The Gauss-Jordan Elimination Method

- 1 Write the augmented matrix corresponding to the linear system.
- 2 Interchange rows (operation 1), if necessary, to obtain an augmented matrix in which the first entry in the first row is non-zero. Then pivot the matrix about this entry.
- 3 Interchange the second row with any row below it, if necessary, to obtain an augmented matrix in which the second entry in the second row is non-zero. Pivot the matrix about this entry.
- 4 Continue until the final matrix is in row-reduced form.

2.3 - System of Equations with Infinitely Many Solutions

We saw last week that the system:

$$3x - 2y = 12$$

$$6x - 4y = 24$$

has infinitely many solutions of the form $(t, \frac{3}{2}t - 6)$ where t can be any real number. What does this look like if we use an augmented matrix and the Gauss-Jordan elimination method?

2.3 - System of Equations with Infinitely Many Solutions

Solve the system of equations:

$$\begin{array}{rcccccc} x & & & - & z & = & 1 \\ -x & + & y & + & 3z & = & 3 \\ -2x & - & 2y & - & 2z & = & -10 \end{array}$$

2.3 - System of Equations with No Solutions

Solve the system of equations:

$$\begin{array}{rcccccc} x & + & y & - & 2z & = & 0 \\ 2x & - & 3y & + & 3z & = & 2 \\ x & + & y & - & 2z & = & 1 \end{array}$$

2.3 - Overdetermined Systems

An overdetermined system is a system of equations that has more equations than unknowns.

Each augmented matrix below is the final form after the Gauss-Jordan method for an overdetermined system with two variables (x and y in order). Find the solutions to each overdetermined system.

$$\left[\begin{array}{cc|c} 1 & 0 & 5 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{array} \right]$$

$$\left[\begin{array}{cc|c} 1 & 0 & 5 \\ 0 & 1 & -2 \\ 0 & 0 & 0 \end{array} \right]$$

$$\left[\begin{array}{cc|c} 1 & -1 & 5 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{array} \right]$$

2.3 - Underdetermined System

An underdetermined system is a system of equations that has more unknowns than equations.

Each augmented matrix below is the final form after the Gauss-Jordan method for an underdetermined system with four variables (x , y , z , and w in order). Find the solutions to each underdetermined system.

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 3 & 5 \\ 0 & 0 & 0 & 0 & 11 \end{array} \right]$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 5 \\ 0 & 1 & -3 & -6 & -2 \end{array} \right]$$

Tan, Section 2.3, Problem 37

The management of Hartman Rent-A-Car has allocated \$1,512,000 to purchase 60 new automobiles to add to the existing fleet of rental cars. The company will choose from compact, mid-sized, and full-sized cars costing \$18,000, \$28,800, and \$39,600 each, respectively. Find formulas giving the options available to the company. Give two specific options.