Part I (due Monday, February 5 at the beginning of class)

New method for solving systems of equations:

Theorem 1. *If A is an invertible $n \times n$ matrix, then for each $n \times 1$ matrix $\vec{b}$, the system $A\vec{x} = \vec{b}$ has exactly one solution, namely, $\vec{x} = A^{-1}\vec{b}$.*

To prove this theorem, we need to show both that $A^{-1}\vec{b}$ is a solution to the system of equations $A\vec{x} = \vec{b}$ and that $A^{-1}\vec{b}$ is the *only* solution to the sytem of equations. You'll do this in your reading questions.

Reading Questions

1. Show that if A is in invertible $n \times n$ matrix, then $\vec{x} = A^{-1}\vec{b}$ is a solution to the system of equations $A\vec{x} = \vec{b}$. To do so, recall what it means for something to be a solution to a system of equations.
2. Now show the uniqueness part of Theorem 1: suppose that $\vec{x}_0$ is a solution to $A\vec{x} = \vec{b}$. What does this imply? Recall that A is invertible, so A^{-1} exists.
3. Use the procedure in Theorem 1 to solve the system

$$\begin{aligned} x_1 + 4x_2 + 3x_3 &= 2 \\ -x_1 - 2x_2 &= 4 \\ 2x_1 + 2x_2 + 3x_3 &= -6. \end{aligned}$$

Part II (due Wednesday, February 7)

There will be a WeBWorK assignment posted by Friday night.

Part III: Homework (due Wednesday, February 7 at the beginning of class)

1. A *symmetric matrix* is a matrix A such that $A^T = A$.
   (a) Give an example of a 3×3 (or larger) symmetric matrix.
   (b) What can you say about the size of a matrix if you know the matrix is symmetric?
   (c) Show that if A is symmetric, then A^2 is symmetric.

Running list of vocabulary words that could be a quiz word

- linear equation
- system of linear equations

- linear combination of a set of vectors
- span of a set of vectors
- linearly independent
- linearly dependent
- reduced row echelon form
- pivot
- homogeneous system
- free variable
- row equivalent
- consistent system
- inconsistent system
- trace of a matrix
- transpose of a matrix
- inverse of a matrix
- elementary matrix