Math 2210Q-004 Applied Linear Algebra
E-Mail Assignments
on the readings in the textbook

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Do not submit responses to this

No Due Date

The first midsemester exam will be on February 24, 2009. It's time to start studying.

To Do: Go back over sections 1.1-1.5, 1.7-1.9, 2.1-2.3 and 2.5

Here are some questions to help jog your studying:

1. **What are the possibilities for the number of solutions to a system of linear equations? Explain why each possibility can indeed arise.**
2. **What is the link between a system of linear equations and an augmented matrix?**
3. **What are the three types of elementary row operations? Give an example for each type.**
4. **What is a pivot position?**
5. **what is the link between the number of parameters and the number of pivot positions.**
6. **What is the definition of a set of vectors $\vec{v}_1, \vec{v}_2, \ldots, \vec{v_n}$ being linearly independent.**
7. **Give me a natural way of thinking of when a set of vectors (as above) are linearly independent.**
8. **Give me an example of three vectors in $\mathbb{R}^5$ which are NOT linearly independent.**
9. **Give me an example of three vectors in $\mathbb{R}^5$ which are linearly independent.**
10. **Which one or both of the following are true:**
11. **How are the vector solutions to $A\vec{x} = \vec{b}$, where $\vec{b} \neq \vec{0}$ related to the vector solutions of $A\vec{x} = \vec{0}$?**
12. **What is the definition of a transformation from $\mathbb{R}^n$ to $\mathbb{R}^m$ being linear? Give an example of a non-linear transformation.**
13. **What is the link between linear transformations and matrices?**
14. **Via the link mentioned in the previous answer, how to concepts like one-to-one and onto translate in terms of the associated matrix?**
15. **What is the definition of a matrix being invertible?**
16. **Give an example of a 2×2 invertible matrix and one which is not invertible.**
17. **Is $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ invertible? If so, what is the inverse?**
18. **Suppose A is a 3×3 invertible matrix with inverse $A^{-1} = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 0 & -2 \\ 0 & 1 & -1 \end{bmatrix}$. Solve the matrix equation $A\vec{x} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$.**
19. **Suppose A LU factorization $A = \begin{bmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 0 & 2 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 3 \end{bmatrix}$. Without multiplying and figuring out A, solve $A\vec{x} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$.**
