Final Review  
Math 205, Spring, 2006

In addition to the topics mentioned of the 3 midterm reviews the following items are covered in the final:

I. Matrix algebra

1. $A \pm B$, $AB$ where $A$ and $B$ are matrices, $kA$ where $k$ is a number. Meaning of $A = B$.

2. Rules of matrix algebra:
   
   $A + B = B + A$  
   $A + (B + C) = (A + B) + C$  
   $-A = (-1)A$  
   $A + (-A) = -A + A = O$  
   $(k + l)A = kA + lA$  
   $k(A + B) = kA + kB$  
   $(kl)A = k(lA)$  
   $A(BC) = (AB)C$  
   $(A + B)C = AC + BC$  
   $AA^{-1} = A^{-1}A = I_n$

   whenever the operations are defined. Here, $A$, $B$, and $C$ are matrices, $A^{-1}$ is the inverse of $A$, $O$ is the zero matrix, $I_n$ is the $n \times n$ identity matrix and $k$ and $l$ are numbers.

3. Deciding if the inverse $A^{-1}$ of a square matrix $A$ exists and computation of the inverse $A^{-1}$ in this case by computing the reduced row-echelon form of the augmented matrix $(A \mid I_n)$.

II. Applications

1. Find the solution of a system of linear equations by the method of inverse matrix:
   
   If $AX = B$ then $X = A^{-1}B$.

2. The open and closed Leontief model of the economy of a country or region.
   
   - **open Leontief model**: Computation of the new output of the industries (persons, ...) of the region if external demand is changing.
   
   - **closed Leontief model**: Computation of the relative income of each industry (person, ...) of the region.