Name _____ **2270-1**

Introduction to Linear Algebra 2270-1
Midterm Exam 1 Spring 2004

Problem 1 due 9 Feb. Problem 2 due 11 Feb.
In-class Exam Date: Tuesday, 17 Feb 2004

Instructions. Take-home problem 1 below is to be submitted at class time on 9 February.
The in-class portion of the exam (17 Feb) consumes the entire class meeting. There are three problems, of a type similar to those on the sample exam. No calculators, notes, tables or books. The sample exam is distributed a few days before the in-class exam date.

1. **(Inverse algorithm)** Determine by (a) `rref` methods and (b) Cramer's rule methods the inverse matrix of

$$A = \begin{pmatrix} 1 & b & 0 \\ a & b & c \\ 0 & 1 & 1 \end{pmatrix}.$$

Please state conditions on a, b, c for when the inverse exists. Show all details by hand. Verify that when the given conditions fail, then A fails to be invertible (cite all results applied). The answer check compares the identical answers obtained in (a) and (b).

Please attach this exam or a copy to the front of your submitted exam on the due date. Kindly write your name on all pages and staple.

Introduction to Linear Algebra 2270-1
Midterm Exam 1 Spring 2004

Problem 2 due 11 Feb.

In-class Exam Date: Tuesday, 17 Feb 2004

Instructions. Take-home problem 2 below is to be submitted at class time on 11 February.
The in-class portion of the exam consumes the entire class meeting. There are three problems, of a type similar to those on the sample exam. No calculators, notes, tables or books. The sample exam is distributed a few days before the in-class exam date.

2. (Elementary matrices) Let $C = \mathbf{aug}(A, \mathbf{b})$ be the augmented matrix of a linear $m \times n$ system $A\mathbf{x} = \mathbf{b}$. Let I be the $m \times m$ identity matrix and denote by E the matrix obtained by applying a `combo` rule to I. Apply the same `combo` rule to matrix C, obtaining a matrix F. Write the details of proof which verify the formula $F = EC$.

The handwritten proof is expected to consist of English sentences and mathematical formulas. It must be succinct, yet correct and readable, with page references to the textbook. It is unacceptable to present examples as proof – the details must apply to any $m \times n$ system.

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