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Math110 Sample Midterm II, Fall 2011

This is a closed book exam; but everyone is allowed a standard one-page cheat sheet (on one-side only). You need to justify every one of your answers unless you are asked not to do so. Completely correct answers given without justification will receive little credit. Problems are not necessarily ordered according to difficulties. You need not simplify your answers unless you are specifically asked to do so. Hand in this exam before you leave.

Problem	Maximum Score	Your Score
1	30	
2	20	
3	20	
4	20	
Total	90	

Write your personal information below and on top of every page in the test.

Your Name: _____

Your GSI: _____

Your SID: _____

1. Label each of the following statements as **TRUE** or **FALSE**. Along with your answer, provide a counterexample, an informal proof or an explanation.

(a) The determinant is a linear function $M_{n \times n}(F) \rightarrow F$.

- (b) Every $n \times n$ matrix may be written as a product of elementary matrices.

(c) If $Ax = 0$ has exactly one solution, then $Ax = b$ has exactly one solution.

2. Use row operations to find the inverse of the matrix

$$\begin{pmatrix} -2 & 1 & 0 \\ 4 & -3 & 1 \\ 1 & 1 & -1 \end{pmatrix}.$$

3. Let A be an $m \times n$ matrix of rank m and let B be an $n \times p$ matrix with rank n . Determine the rank of the matrix AB .

4. If a matrix B is similar to matrix C , show that B^2 is similar to C^2 .