

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS  
DEPARTMENT OF MATHEMATICAL SCIENCES  
MATH 260  
Exam # 2  
December 12, 2006

NAME:

ID#:

**SHOW ALL YOUR WORK**

1. Let  $A$  be the matrix

$$A = \begin{bmatrix} 3 & 0 & 11 & -5 & 0 \\ -2 & 4 & 13 & 6 & 5 \\ 0 & 0 & 5 & 0 & 0 \\ 7 & 6 & -9 & 17 & 7 \\ 0 & 0 & 8 & 2 & 0 \end{bmatrix}.$$

(a) (**3 points**) Compute  $\det A$

(b) (**4 points**) If we write  $A^{-1} = [a_{ij}]$  find  $a_{23}$  and  $a_{25}$ .

2. (4 points) Use row reduction operations to compute  $A^{-1}$  for

$$A = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 2 & 0 \\ 3 & 0 & 0 & 1 \end{bmatrix}.$$

3. (4 points) Suppose  $v_1, v_2, v_3$  are linearly independent vectors. Show that the vectors  $u_1 = v_2 - v_3, u_2 = v_1 - v_3, u_3 = v_1 - v_2$  are also linearly independent.

4. (**5 points**) Show whether or not the vector  $w = (2, -3, 2, -3)$  is in the span of the vectors  $v_1 = (1, 0, 0, 3)$ ,  $v_2 = (0, 1, -2, 0)$ ,  $v_3 = (0, -1, 1, 1)$ .

5. (**5 points**) Find a basis for the solution space of the homogeneous linear system

$$\begin{aligned}x_1 + 3x_2 - 4x_3 - 8x_4 + 6x_5 &= 0 \\x_1 + 2x_3 + x_4 + 3x_5 &= 0 . \\2x_1 + 7x_2 - 10x_3 - 19x_4 + 13x_5 &= 0\end{aligned}$$

6. (**5 points**) In parts a and b below determine whether or not the given vectors in  $\mathbb{R}^n$  form a basis for  $\mathbb{R}^n$ . Justify your answers.

(a)  $v_1 = (0, 2, -3), v_2 = (7, 4, 11)$ .

(b)  $v_1 = (2, 0, 0, 0), v_2 = (0, 3, 0, 0), v_3 = (0, 0, 7, 6), v_4 = (0, 0, 4, 5)$ .