

ING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
DEPARTMENT OF MATHEMATICAL SCIENCES
MATH 260-04
Quiz # 2
November 1, 2006

NAME:	ID#:
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SHOW ALL YOUR WORK

1. What is the minimum and maximum possible number of free variables for the following systems:

(a) **(1point)** A system of 2 equations and 5 variables: min: _____;max: _____

(b) **(1point)** A system of 3 equations and 3 variables: min: _____;max: _____

(c) **(1point)** A system of 3 equations and 2 variables: min: _____;max: _____

2. The following linear system is written in echlon form:

$$\begin{aligned}x_1 - 5x_2 + 2x_3 - 7x_4 + 11x_5 &= 1 \\x_2 - 13x_3 + 3x_4 - 7x_5 &= -1 \\x_4 - 5x_5 &= 2.\end{aligned}$$

(a) **(1point)** Write the augmented matrix for the system.

(b) **(1point)** Identify the leading variables.

(c) **(1point)** Identify the free variables.

(d) **(2points)** Solve the system by back substitution.

(e) **(2points)** Show that all solutions of the system can be written in the form $\mathbf{b}_0 + r\mathbf{b}_1 + s\mathbf{b}_2$, where r and s are arbitrary real numbers and $\mathbf{b}_0, \mathbf{b}_1, \mathbf{b}_2$ are certain vectors (you should give explicitly the vectors $\mathbf{b}_0, \mathbf{b}_1, \mathbf{b}_2$).