Name: Thursday section time:
Student ID:

Math 20F - Linear Algebra - Spring 2003

Quiz #1 — April 10 — ANSWERS

(Do not the discuss quiz with students who haven't taken it yet – until 8:00pm.)
You must show your work in order to get credit for a problem. Label your answers clearly.

Consider the following system of linear equations:

$$\begin{aligned} x_1 + 2x_2 + 3x_3 + 4x_4 &= 3 \\ 2x_1 + 2x_2 + 8x_3 + 6x_4 &= 8 \\ x_3 - x_4 &= 1 \end{aligned}$$

a. Express this system of linear equations as an augmented matrix.

b. Put it into reduced row echelon form (RREF).

c. Which variables are free variables? Which variables are lead variables?

d. What is the solution set of the system of linear equations?

ANSWERS:

a. $\left(\begin{array}{cccc|c} 1 & 2 & 3 & 4 & 3 \\ 2 & 2 & 8 & 6 & 8 \\ 0 & 0 & 1 & -1 & 1 \end{array}\right)$

b. $\Rightarrow \left(\begin{array}{cccc|c} 1 & 2 & 3 & 4 & 3 \\ 0 & -2 & 2 & -2 & 2 \\ 0 & 0 & 1 & -1 & 1 \end{array}\right) \Rightarrow \left(\begin{array}{cccc|c} 1 & 2 & 3 & 4 & 3 \\ 0 & 1 & -1 & 1 & -1 \\ 0 & 0 & 1 & -1 & 1 \end{array}\right) \Rightarrow \left(\begin{array}{cccc|c} 1 & 2 & 0 & 7 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 & 1 \end{array}\right)$

$\Rightarrow \left(\begin{array}{cccc|c} 1 & 0 & 0 & 7 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & -1 & 1 \end{array}\right)$

c. x_4 *is a free variable.* x_1, x_2, x_3 *are lead variables.*

d. *Solution Set* $= \{(-7\alpha,\ 0,\ 1+\alpha,\ \alpha) : \alpha \in \mathbb{R}\}$.