

Math 2311 Quiz #2

FALL SEMESTER 2007

Name SOLUTIONS

1. Let $A = \begin{pmatrix} 1 & 2 & -3 & 1 & 2 \\ 2 & 4 & -4 & 6 & 10 \\ 3 & 6 & -6 & 9 & 13 \end{pmatrix} \xrightarrow{\substack{-2R_1+R_2 \\ -3R_1+R_3}} \begin{pmatrix} 1 & 2 & -3 & 1 & 2 \\ 0 & 0 & 2 & 4 & 6 \\ 0 & 0 & 3 & 6 & 7 \end{pmatrix} \xrightarrow{\substack{2R_1 \\ 2R_3}} \begin{pmatrix} 2 & 4 & -6 & 2 & 4 \\ 0 & 0 & 2 & 4 & 6 \\ 0 & 0 & 6 & 12 & 14 \end{pmatrix}$

(a) Put A into RREF form.

$$\begin{matrix} 3R_2+R_1 \\ -3R_2+R_3 \end{matrix} \rightarrow \begin{pmatrix} 2 & 4 & 0 & 14 & 22 \\ 0 & 0 & 2 & 4 & 6 \\ 0 & 0 & 0 & 0 & -4 \end{pmatrix} \xrightarrow{-\frac{1}{4}R_3} \begin{pmatrix} 2 & 4 & 0 & 14 & 22 \\ 0 & 0 & 2 & 4 & 6 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \xrightarrow{\substack{-6R_2+R_2 \\ -22R_3+R_1}} \begin{pmatrix} 2 & 4 & 0 & 14 & 0 \\ 0 & 0 & 2 & 4 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$\begin{matrix} \frac{1}{2}R_1 \\ \frac{1}{2}R_2 \end{matrix} \rightarrow \begin{pmatrix} 1 & 2 & 0 & 7 & 0 \\ 0 & 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

(b) Solve the system of equations for all solutions (in parametric form):

$$x + 2y - 3z + w + 2u = 0$$

$$2x + 4y - 4z + 6w + 10u = 0$$

$$3x + 6y - 6z + 9w + 13u = 0.$$

basic variables: x, z, u

free variables: y, w

$$x = -2y - 7w$$

$$z = -2w$$

$$u = 0$$

Every solution is of the form

$$(x, y, z, w, u) = (-2y - 7w, y, -2w, w, 0)$$

$$= y(-2, 1, 0, 0, 0) + w(-7, 0, -2, 1, 0)$$