Name: KEY

Math 2250, Fall 2015, Quiz 5 **October 14, 2015** **R. Bruner**

1. Write 3×3 elementary matrices which correspond to the following row operations

$(a)\ R_1 \longleftrightarrow R_2$ $(b)\ R_2 - 3R_1 \longrightarrow R_2$ $(c)\ 2R_2 \longrightarrow R_2$

$$\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \qquad \begin{bmatrix} 1 & 0 & 0 \\ -3 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \qquad \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

2. Compute the inverse of

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

$$\left[\begin{array}{ccc|ccc} 1 & 2 & 3 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 \end{array}\right] \longrightarrow \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 0 & 0 & 1 \\ 1 & 2 & 3 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \end{array}\right] \xrightarrow[-R_1]{-R_1} \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 2 & 3 & 1 & 0 & -1 \\ 0 & 1 & 0 & 0 & 1 & -1 \end{array}\right] \longrightarrow$$

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & -1 \\ 0 & 2 & 3 & 1 & 0 & -1 \end{array}\right] \xrightarrow[-2R_2]{} \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & -1 \\ 0 & 0 & 3 & 1 & -2 & 1 \end{array}\right] \xrightarrow[* 1/3]{} \left[\begin{array}{c|ccc} I & 0 & 0 & 1 \\ & 0 & 1 & -1 \\ & 1/3 & -2/3 & 1/3 \end{array}\right]$$

So $$\begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}^{-1} = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & -1 \\ 1/3 & -2/3 & 1/3 \end{bmatrix}$$