MATH 105A and 110A Review: Elementary matrices and row operations

1. Identify which matrices are in echelon form, reduced echelon form, or neither.

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix} \qquad \begin{bmatrix} 2 & 0 & 0 & 4 \\ 0 & 1 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad \begin{bmatrix} 1 & 0 & 2 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad \begin{bmatrix} 1 & 0 & 3 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

2. Reduce A to reduced echelon form.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 1 & 0 & 1 \end{bmatrix}.$$

3. Carry out row operation $R_2 + 3R_1 \to R_2$ on matrix A using an elementary matrix, where

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