Assignment for Section 2.3: Elimination using matrices

(1) Write done the 3 by 3 matrices that produce the following elimination steps.

(a) E_{21} subtracts 5 times row 1 from row 2.

(b) P exchanges rows 1 and 2, and then rows 2 and 3.

(2) Multiplies these matrices

$$E = \begin{bmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & 0 & 1 \end{bmatrix}, \quad F = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & c & 1 \end{bmatrix}$$

in the orders EF and FE. Also computed EE and FFF.

(3) Consider

$$\begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 17 \end{bmatrix}.$$

(a) Apply elimination to the 2 by 3 augmented matrix $[A\ \boldsymbol{b}]$.

(b) What is the triangular system $U\boldsymbol{x} = \boldsymbol{c}$?

(c) What is the solution $\boldsymbol{x}$?

(4) If $AB = I$ and $BC = I$, use the associative law to prove $A = C$.