Name:
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1. (10 points) How could you factor A into a product UL, upper triangular times lower triangular?

2. (5 points) Write down all six of the 3 by 3 permutation matrices, including P = I. Identify their inverses, which are also permutation matrices. The inverses satisfy $PP^{-1} = I$ and are on the same list.

3. (5 points) Suppose A commutes with every 2 by 2 matrix (AB = BA). Show that $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is a multiple of the identity, i.e., $A = \begin{bmatrix} a & 0 \\ 0 & a \end{bmatrix}$

4. (5 points) Compute the following three matrices:

$$\begin{bmatrix} 1 & 0 & 0 \\ \alpha & 1 & 0 \\ \beta & 0 & 1 \end{bmatrix}^{n}, \qquad \begin{bmatrix} 1 & 0 & 0 \\ \alpha & 1 & 0 \\ \beta & 0 & 1 \end{bmatrix}^{-1}, \qquad \begin{bmatrix} 1 & 0 & 0 \\ \alpha & 1 & 0 \\ 0 & \beta & 1 \end{bmatrix}^{-1}$$