1. The matrix
$$\begin{pmatrix} 10 & 0 & 7 & -7 \\ 4 & 5 & 2 & -2 \\ 16 & 4 & 15 & -8 \\ 30 & 4 & 26 & -19 \end{pmatrix}$$
has three eigenvalues $3, -4$ and 5. Determine the remaining eigenvalue.

2. Factorize the following matrix as RJR^{-1}, where R is regular and J is in the Jordan normal form.
$$\begin{pmatrix} -11 & 30 \\ -10 & 24 \end{pmatrix}$$
$$\begin{pmatrix} 0 & 2 & -2 \\ 1 & -1 & 5 \\ 2 & -4 & 8 \end{pmatrix}$$
$$\begin{pmatrix} 2 & 0 & 0 \\ -4 & 1 & 3 \\ -4 & 0 & 4 \end{pmatrix}$$
$$\begin{pmatrix} 4 & -2 & 0 \\ 0 & 2 & 0 \\ 6 & -5 & 1 \end{pmatrix}$$

3. Transform the following matrix into Jordan normal form and determine eigenvectors, and if necessary also generalized eigenvectors. $\begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 3 \end{pmatrix}$

4. Use Jordan normal form and calculate the third power and a square root of the following matrix. (By a square root consider a matrix whose second power is the given matrix.)
$$\begin{pmatrix} -11 & 30 \\ -10 & 24 \end{pmatrix}$$