Problem 1. Using Guassian elimination on the extended matrix as described in the book, find the inverse to

\[
\begin{bmatrix}
1 & 1 & 0 & 0 \\
0 & 1 & 1 & 0 \\
0 & 0 & 1 & 1 \\
0 & 0 & 0 & 1
\end{bmatrix}
\]

Problem 2. Express the following matrix as a product of elementary matrices:

\[
A = \begin{bmatrix}
2 & 1 \\
0 & 2
\end{bmatrix}
\]

Problem 3. Suppose \( A \) is a 3 by 3 matrix that can be row reduced to \( I \) using the following row operations, in the order given:

2R2 \( \rightarrow \) R2
R1 \( - \) R2 \( \rightarrow \) R1
R3 \( - \) R2 \( \rightarrow \) R3
R2 \( - \) R1 \( \rightarrow \) R2
R3 \( \leftrightarrow \) R2

What is \( A \)?

Problem 4. For any real number \( r \), the following matrix has an inverse. Calculate the inverse:

\[
\begin{bmatrix}
1 & r & 0 \\
0 & 1 & 2 \\
0 & 0 & 1
\end{bmatrix}
\]

Problem 5. Suppose \( r \) is a real number. Find the inverse of the following matrix, except for those values of \( r \) that make the matrix singular:

\[
\begin{bmatrix}
1 & r & 0 \\
1 & 1 & 0 \\
2 & 2 & 1
\end{bmatrix}
\]

Problem 6. Problem 15 on page 59.

Problem 7. Problem 29 on page 60.