1. Use formula (4.2) to find a formula for

\[
\det \begin{bmatrix}
   a_{11} & a_{12} & a_{13} \\
   a_{21} & a_{22} & a_{23} \\
   a_{31} & a_{32} & a_{33}
\end{bmatrix}.
\]

2. Prove that if \( A \) is upper triangular, \( \det(A) = \prod_{j=1}^{n} a_{jj} \).

3. Suppose that \( \dim V = n \) and \( T \in \mathcal{L}(V) \) has \( n \) distinct eigenvalues \( \lambda_1, \ldots, \lambda_n \).

   Prove that

\[
\det T = \lambda_1 \ldots \lambda_n.
\]