**Objective**

The task involved diagonalizing a given square matrix AAA to find its diagonal matrix DDD and the inverse of the eigenvector matrix P−1P^{-1}P−1.

**Methodology**

1. **Eigen Decomposition**:
   * The matrix AAA was decomposed into eigenvalues and eigenvectors using np.linalg.eig().
   * The diagonal matrix DDD was constructed from the eigenvalues.
2. **Matrix Reconstruction**:
   * The original matrix AAA was verified using the formula: A=P⋅D⋅P−1A = P \cdot D \cdot P^{-1}A=P⋅D⋅P−1
   * This ensures the accuracy of diagonalization.

**Results**

1. **Given Matrix**: A=[4123]A = \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}A=[42​13​]
2. **Diagonal Matrix**: D=[5002]D = \begin{bmatrix} 5 & 0 \\ 0 & 2 \end{bmatrix}D=[50​02​]
3. **Eigenvector Matrix**: P=[0.7071−0.44720.70710.8944]P = \begin{bmatrix} 0.7071 & -0.4472 \\ 0.7071 & 0.8944 \end{bmatrix}P=[0.70710.7071​−0.44720.8944​]
4. **Inverse of PPP**: P−1=[0.94280.4714−0.74540.7454]P^{-1} = \begin{bmatrix} 0.9428 & 0.4714 \\ -0.7454 & 0.7454 \end{bmatrix}P−1=[0.9428−0.7454​0.47140.7454​]

**Conclusion**

Matrix AAA was successfully diagonalized, and the reconstruction confirmed the results. This process demonstrates the use of eigen decomposition to simplify matrices for further applications in linear algebra.