$\Leftarrow$ Please put scrap work for problem 2 on the page to the left $\Leftarrow$.

Put neat, clear work to be graded for problem 2 below. $\downarrow$

(If you need the space, clearly mark work to be graded on the scrap page.)

2) (35 pt) Let $A = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix}$.

a) (10 pt) Find all eigenvalues of $A$. **HINT**: There is a row or column that makes calculations of the determinant easy.

b) (20 pt) Find an ORTHONORMAL basis for the eigenspace of each eigenvalue of $A$.

c) (5 pt) Write down a a diagonal matrix $D$ and an orthogonal matrix $P$ (with ORTHONORMAL columns) such that $A = PDP^{-1}$ (do not compute $P^{-1} = P^T$).