



Show all work, including mental steps, in a clearly organized way that speaks for itself. Use proper mathematical notation, identifying expressions by their proper symbols (introducing them if necessary), and use arrows and equal signs when appropriate. Always simplify expressions. BOX final short answers. LABEL parts of problem. Keep answers EXACT (not decimal approximations).

①  $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$  Find the eigenvalues of this matrix.

②  $A = \begin{bmatrix} 2 & 0 & 3 \\ -3 & -1 & -3 \\ 0 & 0 & -1 \end{bmatrix}$  This matrix has eigenvalues:  $\lambda = -1, -1, 2$ .  
Find a basis of the two eigenspaces, giving your final results in the form:  $\lambda = -1$ :  $[\ast, \ast, \ast], [\ast, \ast, \ast]$   
 $\lambda = 2$ :  $[\ast, \ast, \ast]$