

Show absolutely all work (no scratch paper calculations omitted or mental calculations unreported) on this sheet in a clearly organized way, labeling problems, parts, and expressions (by their proper symbols). **Box** short final answers.

$$\vec{b}_1 = (1, -2), \vec{b}_2 = (1, 1), \vec{v} = (1, 2), \quad \begin{bmatrix} a & b \\ c & d \end{bmatrix}^{-1} = \frac{1}{ad-bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}.$$

- Make a diagram (label axes) of the vectors $\vec{b}_1, \vec{b}_2, \vec{v}$ and including the parallelogram representing the projections along the axes of \vec{b}_1 and \vec{b}_2 of the vector \vec{v} .
- From your diagram, guess approximate (rough) values of the coordinate values y_1 and y_2 for \vec{v} expressed in the basis $\{\vec{b}_1, \vec{b}_2\}$.
- Now find these coordinates using either an inverse matrix or row reduction
[final answer: $y_1 = \dots, y_2 = \dots$]
- How close was your guess? (Don't change your guess now!).
- Now find the coordinates (y_1, y_2) of a general vector $\vec{x} = (x_1, x_2)$ with respect to this basis.
[final answer: $y_1 = \dots, y_2 = \dots$]