

A good stack of examples, as large as possible, is indispensable for a thorough understanding of any concept, and when I want to learn something new, I make it my first job to build one.

Name and section: _____

1. Let $B = \left\{ b_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}, b_2 = \begin{bmatrix} 5 \\ 3 \end{bmatrix} \right\}$ and $C = \left\{ c_1 = \begin{bmatrix} 4 \\ -3 \end{bmatrix}, c_2 = \begin{bmatrix} -1 \\ 1 \end{bmatrix} \right\}$ be two bases of \mathbb{R}^2 .
 - (a) (3 points) Find the change-of-coordinates matrix $P_{C \leftarrow B}$ from B to C .
 - (b) (2 points) Compute the C -coordinates of the vector $v = 2b_1 - 4b_2$.

2. (5 points) Let $A = \begin{bmatrix} 1 & -3 \\ 1 & 5 \end{bmatrix}$.

- (a) (1 point) Compute the characteristic polynomial of A .
- (b) (2 points) Use the characteristic polynomial to find the eigenvalues of A .
- (c) (2 points) For each eigenvalue of A , find an eigenvector.