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Let  $B = \{ v_1, v_2, \dots, v_m \}$  be a basis of a subspace  $V$ . Finding the  $B$ -coordinates of a vector  $x$  means solving the vector equation.  $x = c_1 v_1 + c_2 v_2 + \dots + c_m v_m$ . If  $x$  is not in  $V$ , then this equation has no solution, as  $x$  is not in  $V = \text{Span} \{ v_1, v_2, \dots, v_m \}$ .

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A vector between A and B is written as  $\vec{AB}$ . The vectors standard position has its starting point in origin. The component form of a vector is the ordered pair that describes the changes in the x- and y-values. In the graph above  $x_1 = 0$ ,  $y_1 = 0$  and  $x_2 = 2$ ,  $y_2 = 5$ . The ordered pair that describes the changes is  $(x_2 - x_1, y_2 - y_1)$ , in our example  $(2-0, 5-0)$  or  $(2,5)$ .

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Let  $V$  be the vector space of all  $2 \times 2$  matrices, and let the subset  $S$  of  $V$  be defined by  $S = \{A_1, A_2, A_3,$

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$A_4$ }, where.  $A_1 = [1\ 2\ -1\ 3]$ ,  $A_2 = [0\ -1\ 1\ 4]$ ,  $A_3 = [-1\ 0\ 1\ -10]$ ,  $A_4 = [3\ 7\ -2\ 6]$ . Find a basis of the span  $\text{Span}(S)$  consisting of vectors in  $S$  and find the dimension of  $\text{Span}(S)$ .

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