

Math 1553 Worksheet §3.1, §3.2

1. Write a set of three vectors whose span is a plane in $\mathbf{R}^3$.

2. Consider the system of linear equations

$$\begin{aligned}x + 2y &= 7 \\2x + y &= -2 \\-x - y &= 4.\end{aligned}$$

Question: Does this system have a solution? If so, what is the solution set?

- a) Formulate this question as an augmented matrix.

- b) Formulate this question as a vector equation.

- c) What does this mean in terms of spans?

- d) Answer the question using the [interactive demo](#).

- e) Answer the question using row reduction.

- 3.** Zander has challenged you to find his hidden treasure, located at some point (a, b, c) . He has honestly guaranteed you that the treasure can be found by starting at the origin and taking steps in directions given by

$$v_1 = \begin{pmatrix} 1 \\ -1 \\ -2 \end{pmatrix} \quad v_2 = \begin{pmatrix} 5 \\ -4 \\ -7 \end{pmatrix} \quad v_3 = \begin{pmatrix} -3 \\ 1 \\ 0 \end{pmatrix}.$$

By decoding Zander's message, you have discovered that the first and second coordinates of the treasure's location are (in order) -4 and 3 .

a) What is the treasure's full location?

b) Give instructions for how to find the treasure by only moving in the directions given by v_1 , v_2 , and v_3 .