

*Introduction to*  
***Lines, planes and other straight objects***

***What you need to know already:***

- ▶ What matrices and determinants are.
- ▶ How to solve a linear system by using matrices.
- ▶ What is meant by the Cartesian plane and 3-dimensional space.

***What you can learn in this chapter:***

- ▶ How vectors and systems can be used to identify and/or describe lines and planes and other straight geometrical objects in 2, 3 and higher dimensions.

In past chapters we have become familiar with linear systems and the matrices that represent them. But why do we call these systems *linear*, when we have not seen any connections with lines yet?

*Is it because these systems represent something that is "straight" in a way that reminds us of lines, but is more general?*

Wow! Good answer: our readers will start to suspect that we are in cahoots!

*Well, your chapter title gave it away!*

Mission accomplished, then. We shall make that connection in this chapter, starting with a quick review of certain facts about lines that should be already

familiar to you. We shall then expand and generalize them to other straight objects, such as planes and hyperplanes. While we do that, we shall take advantage of the machinery of vectors, systems and matrices to develop new ways of identifying these straight objects and new ways to find information about them.

*We must be getting into the thick of linear algebra, what with straight objects and generalizations...*

Absolutely, but we shall still start from familiar, mostly geometric concepts. I hope you will hook onto the familiar to ascend to the new.

***What questions do you have for your instructor?***