

Chapter 9 Figures From

MATHEMATICAL METHODS for Scientists and Engineers

Donald A. McQuarrie



For the Novice Acrobat User or the Forgetful

When you opened this file you should have seen a slightly modified cover of the book *Mathematical Methods for Scientists and Engineers* by Donald A. McQuarrie, a menu bar at the top, some index markers at the left hand margin, and a scroll bar at the right margin.

Select the **View** menu item in the top menu and be sure **Fit in Window** and **Single Page** are selected. Select the **Window** menu item and be sure **Bookmarks** and **Thumbnails** ARE NOT selected.

You can and probably should make the top menu bar disappear by pressing the function key F9. Pressing this key (F9) again just toggles the menu bar back on. You may see another tool bar that is controlled by function key F8. Press function key F8 until the tool bar disappears.

In the upper right hand corner margin of the window containing this text you should see a few small boxes. DO NOT move your mouse to the box on the extreme right and click in it; your window will disappear! Move your mouse to the second box from the right and click (or left click); the window containing this text should enlarge to fill the screen. Clicking again in this box will shrink the window; clicking again will return the display to full screen.

The preferred means of navigation to any desired figure is controlled by the scroll bar in the column at the extreme right of the screen image. Move your mouse over the scroll bar slider, click, and hold the mouse button down. A small window will appear with the text "README (2 of 11)". Continuing to hold down the mouse button and dragging the button down will change the text in the small window to something like "9.4 (6 of 11)". Releasing the mouse button at this point moves you to Figure 9.4 of Chapter 9. The (6 of 11) indicates that Figure 9.4 resides on page 6 of the 11 pages of this document.

ANIMATIONS

There are no animations in this chapter.

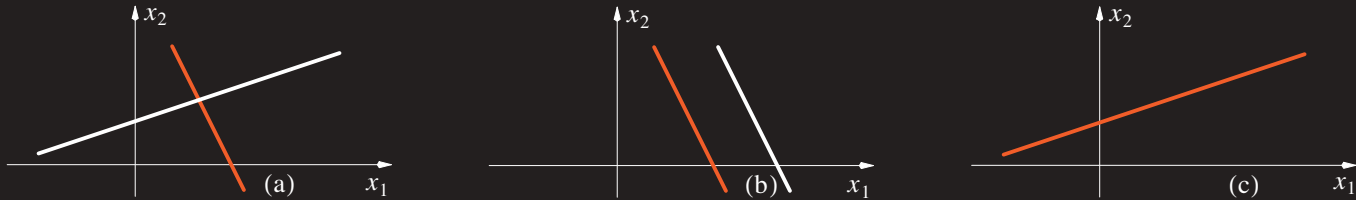


Figure 9.1

The three geometric possibilities of the graphs of two linear algebraic equations in two unknowns, x_1 and x_2 . (a) The colored line ($2x_1 + x_2 = 3$) and the white line ($x_1 - 3x_2 = -2$) have a unique point of intersection. (b) The colored line ($2x_1 + x_2 = 3$) and the white line ($2x_1 + x_2 = 5$) are parallel and have no point of intersection. (c) The two lines ($2x_1 - x_2 = 1$) and ($4x_1 - 2x_2 = 2$) superimpose, and so there is an infinite number of solutions.

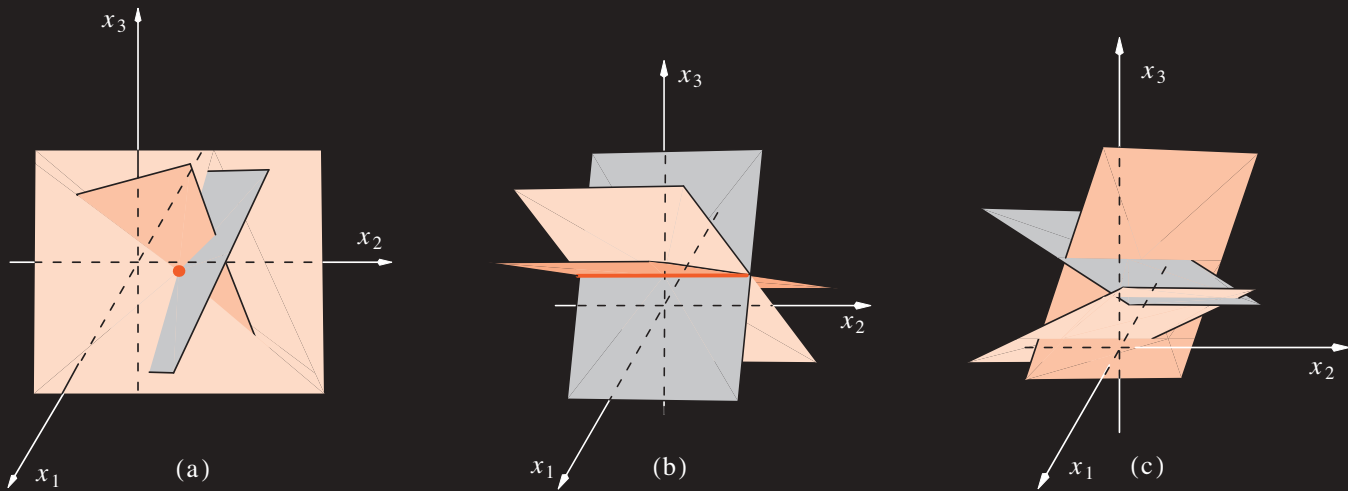


Figure 9.2

The three geometric possibilities of the graphs of three linear algebraic equations: (a) a unique solution; (b) an infinite number of solutions; and (c) no solution.

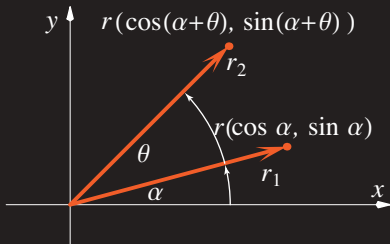


Figure 9.3.

A pictorial representation of the rotation of a vector $\mathbf{r}_1$ through an angle θ in a counterclockwise direction. The result is the vector $\mathbf{r}_2$.

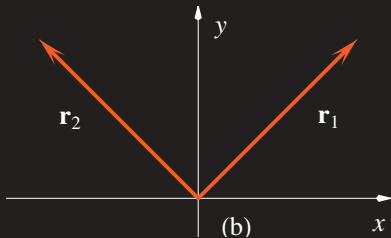
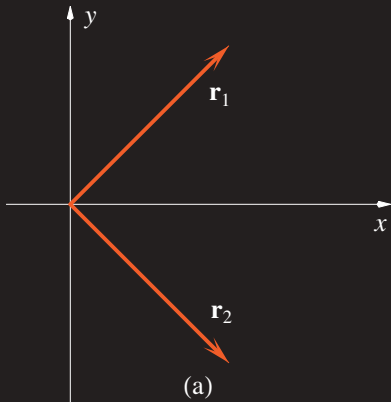


Figure 9.4

A pictorial representation of the reflection of a vector through (a) the x axis and (b) the y axis.

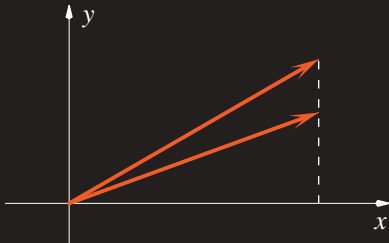


Figure 9.5

An illustration of why a matrix corresponding to a projection does not have an inverse. Both vectors have the same projection onto the x axis.

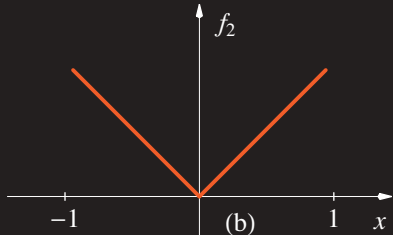
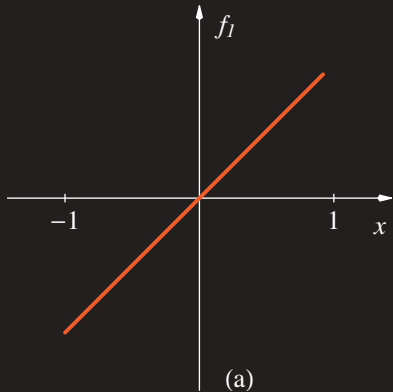


Figure 9.6

The functions $f_1(x) = x$ and $f_2(x) = |x|$ in Example 6 are linearly independent over the interval $-1 \leq x \leq 1$.

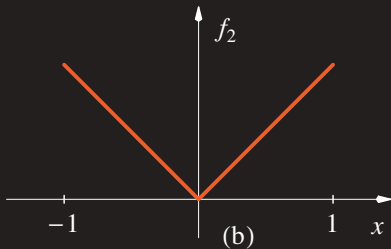
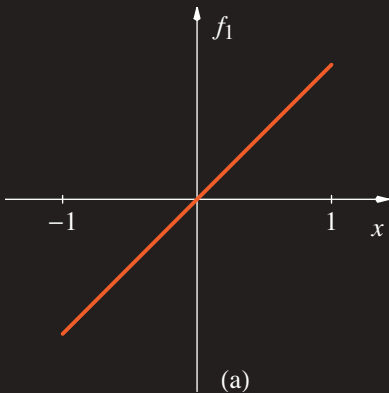


Figure 9.7

The functions $f_1(x) = x$ and $f_2(x) = |x|$ in Example 6 are linearly dependent over the interval $0 \leq x \leq 1$.

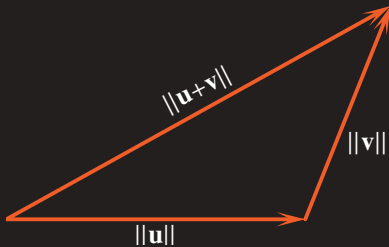


Figure 9.8

An illustration of the triangle inequality presented in Equation 10.

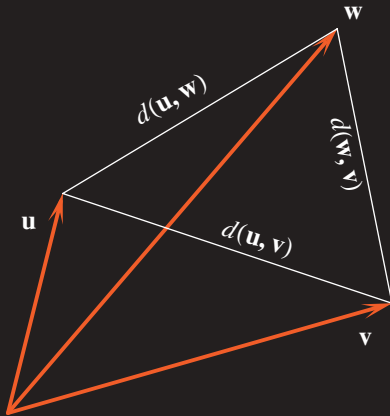


Figure 9.9

An illustration of the triangle inequality presented in Equation 13.