Chapter 6 Figures 21 To 30 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 prefered 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 12)". Continuing to hold down the mouse button and dragging the button down will change the text in the small window to something like "6.24 (6 of 12)". Releasing the mouse button at this point moves you to Figure 6.24 of Chapter 6. The (6 of 12) indicates that Figure 6.24 resides on page 6 of the 12 pages of this document.

ANIMATIONS

There are no animations in this chapter.

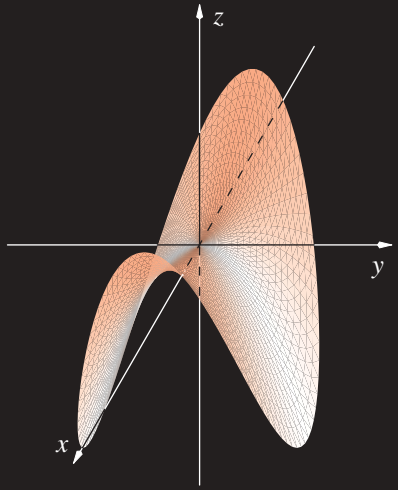


Figure 6.21
The surface of an hyperboloic paraboloid of one sheet described by $cz = \frac{x^2}{a^2} - \frac{y^2}{b^2}$.

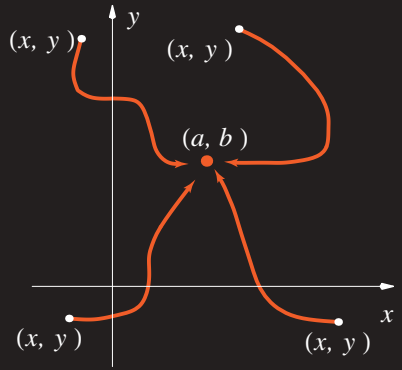


Figure 6.22
If the limit of $f(x, y)$ exists at the point (a, b), it must have the same value independent of the path along which (x, y) approaches (a, b).

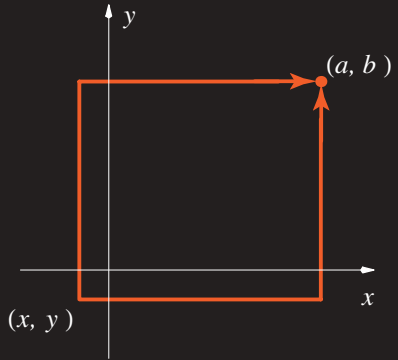


Figure 6.23
An illustration of the sequential limits in Equation 4.

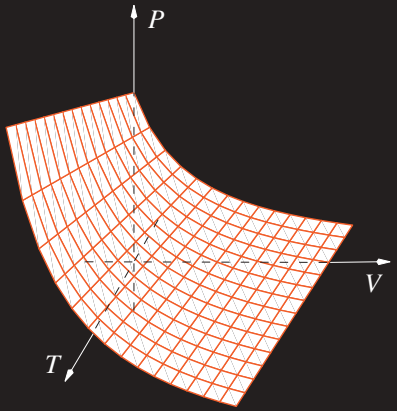


Figure 6.24
The pressure surface for the van der Waals equation.

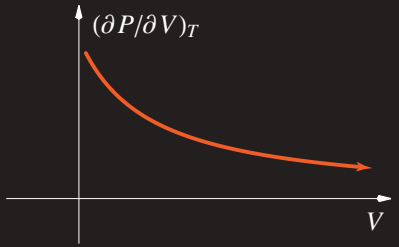
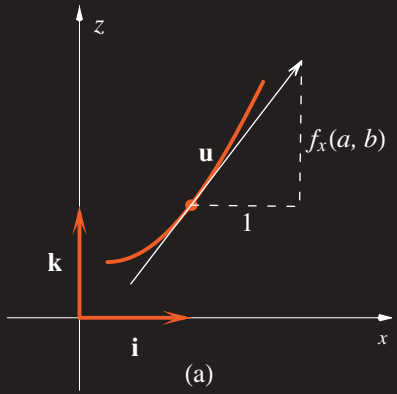


Figure 6.25
The partial derivative $(\partial P/\partial V)_T$ at $T = 500$ K for the van der Waals equation is the slope of the P-V cross section shown above.



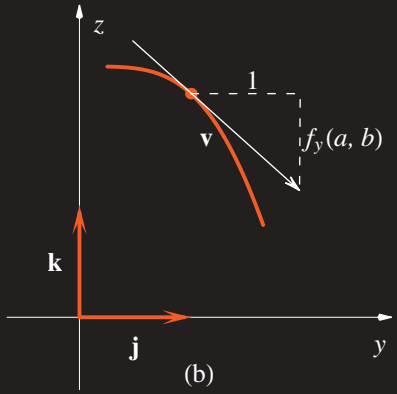


Figure 6.26

(a) The tangent line to the intersection of the surface $z = f(x, y)$ in the plane $y = b$ at the point $P = (a, b, f(a, b))$ is parallel to the vector $\mathbf{u} = \mathbf{i} + f_x(a, b)\mathbf{k}$.

(b) The tangent line to the intersection of the surface $z = f(x, y)$ in the plane $x =$ a at the point $P = (a, b, f(a, b))$ is parallel to the vector $\mathbf{v} = \mathbf{j} + f_y(a, b)\mathbf{k}$.

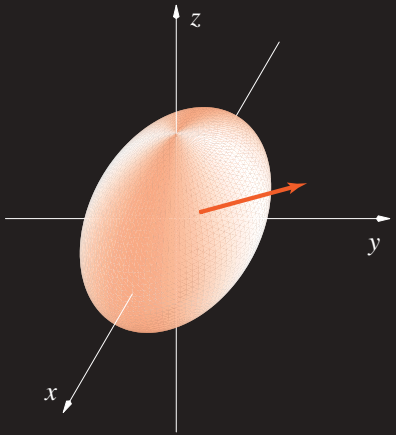


Figure 6.27
The outward unit normal vector to the spherical surface $x^2 + y^2 + z^2 = a^2$ at the point $(a/\sqrt{3}, a/\sqrt{3}, a/\sqrt{3})$.

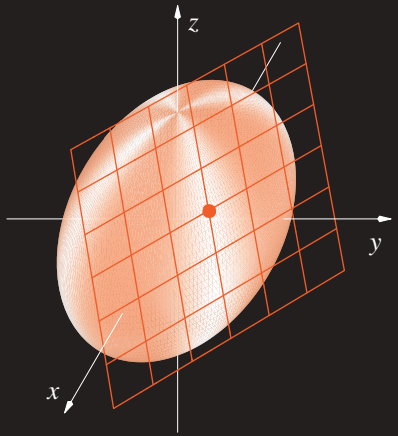


Figure 6.28
The tangent plane to the spherical surface $x^2 + y^2 + z^2 = a^2$ at the point $(a/\sqrt{3}, a/\sqrt{3}, a/\sqrt{3})$.

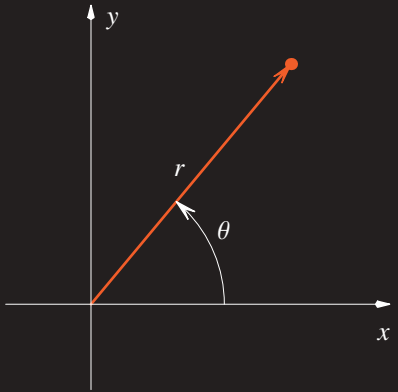


Figure 6.29
A point in a plane may be specified by its distance from the origin (r) and the angle that a line from the origin to the point makes with the x axis (θ). The quantities r and θ are called polar coordinates.

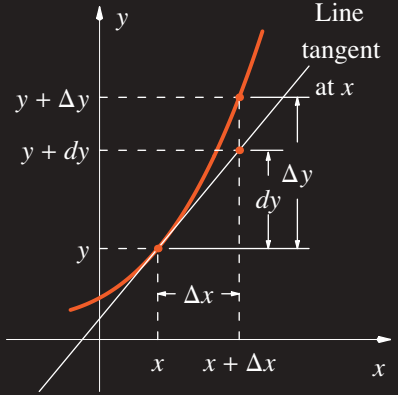


Figure 6.30
An illustration of the difference between dy and Δy.