Chapter 22 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 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 20)". Continuing to hold down the mouse button and dragging the button down will change the text in the small window to something like "22.4 (6 of 20)". Releasing the mouse button at this point moves you to Figure 22.4 of Chapter 22. The (6 of 20) indicates that Figure 22.4 resides on page 6 of the 20 pages of this document.

ANIMATIONS

Figures 22.1 and 22.6 each has an associated animation file that requires QuickTime™ for display. The animation files are named Anim22_1.mov and Anim22_6.mov, respectively. The files must be independently acquired from the server.

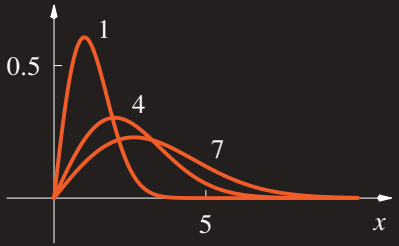


Figure 22.1
The Raleigh distribution $x\, e^{-x^2/2\alpha}/\alpha$, $x \geq 0$, $\alpha > 0$, for several values of α.

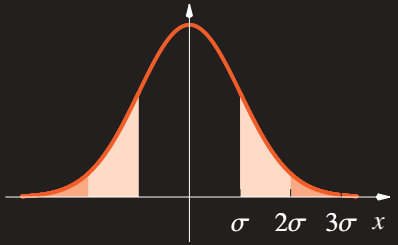


Figure 22.2
The area of a normal distribution between $\mu - n\sigma$ and $\mu + n\sigma$ is 0.6826, 0.9544, and 0.9974 for $n = 1$, 2, and 3, respectively.

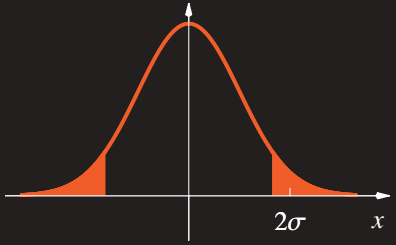


Figure 22.3
A normal curve for which Prob{$-x \le X \le x$} = 0.900 has an area of 0.050 in each wing.

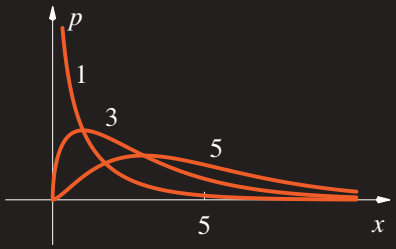


Figure 22.4
The chi-square distribution for $n = 1$, 3, and 5 degrees of freedom.

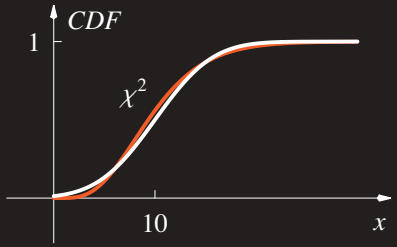


Figure 22.5
A comparison of the chi-squared cumulative distribution function for $n = 10$ (color) and a normal cumulative distribution function with $\mu = x - n = x - 10$ and $\sigma = (2n)^{1/2} = (20)^{1/2}$ (black).

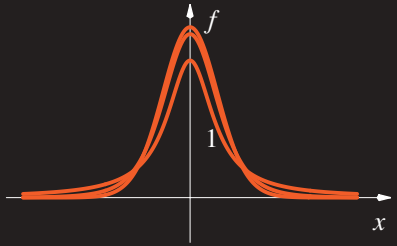


Figure 22.6
The Student t-disribution for n = 1, 5, 10, and 30. Note that the curves for n = 5 and n = 30 almost superimpose.

Figure 22.7
The density function of a t-distribution for 6 degrees of freedom.

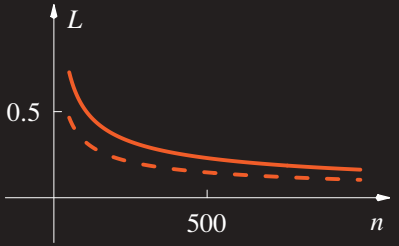


Figure 22.8
The length of the confidence interval (in multiples of σ) for the mean of a normal distribution with known variance plotted against the sample size n for $\eta = 0.95$ (dashed) and 0.99 (solid).

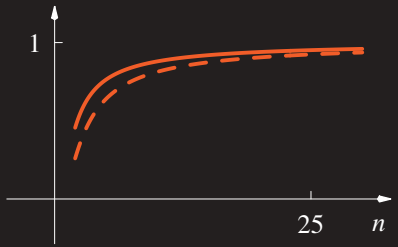


Figure 22.9
The ratios of the confidence intervals for the mean of a normal distribution with and without knowledge of the variance against n for $\eta = 0.95$ (solid) and 0.99 (dashed) (assuming that $\sigma^2 = s^2$).

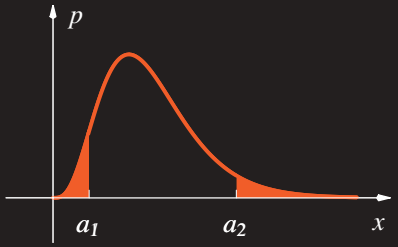


Figure 22.10
The two values a_1 and a_2 in the test given in Table 22.5 are chosen such that the area to the left of a_1 is equal to the area to the right of a_2.

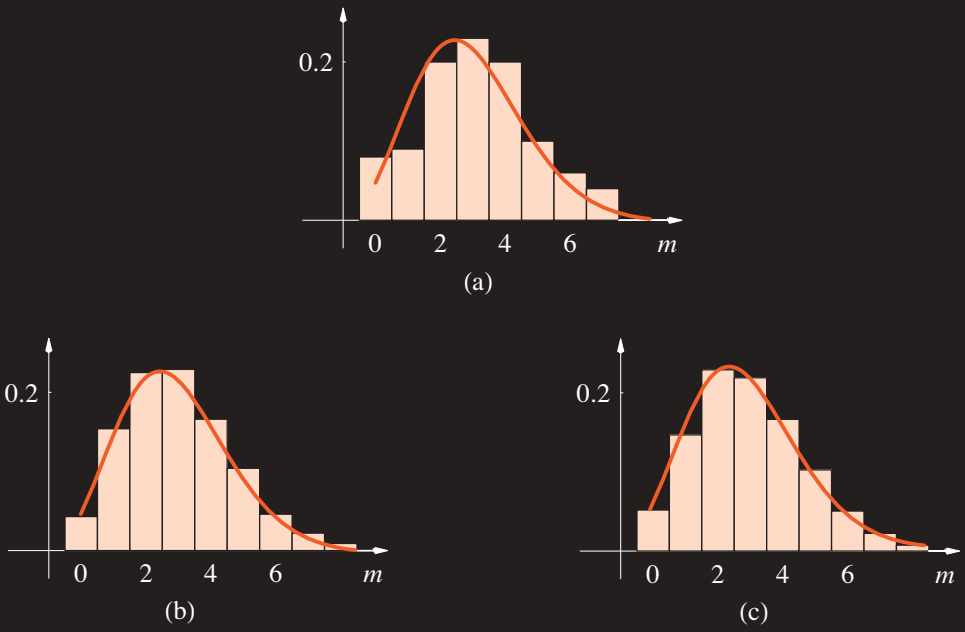


Figure 22.11
Bar graph of (a) 100, (b) 1000, and (c) 10 000 sample data taken from a poisson distribution with mean equal to 3 (color).

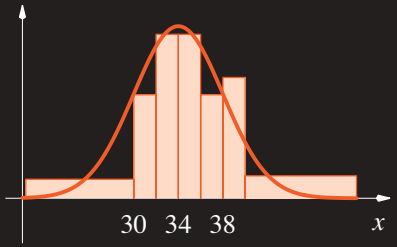
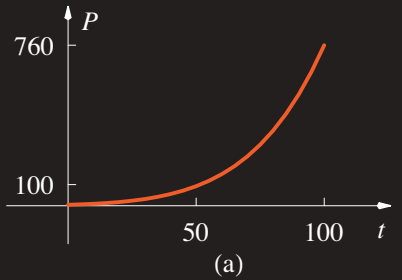


Figure 22.12
A bar graph of the data used in Example 4.



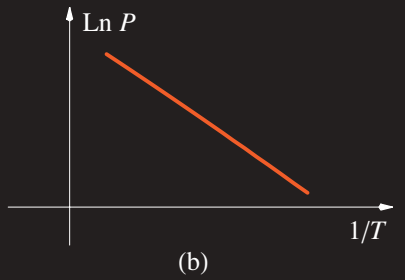


Figure 22.13
(a) The vapor pressure of water plotted against the celsius temperature. (b) The logarithm of the vapor pressure of water plotted against the reciprocal of the kelvin temperature.

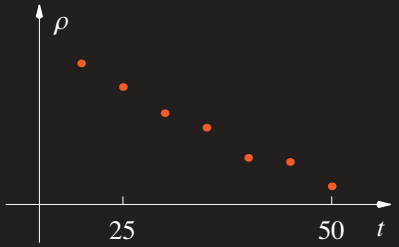


Figure 22.14
The resistivity ρ of nichrome as a function of the celsius temperature. The resititvity is expressed in units of meters • ohms$\times 10^{-7}$.

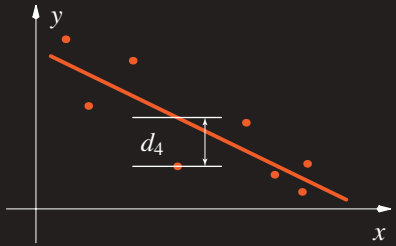


Figure 22.15
A set of data points with a straight line drawn through them. If the equation of the straight line is $y = a + b\,x$, then the vertical distance of y_j from the line is $d_j = y_j - a - b\,x_j$.

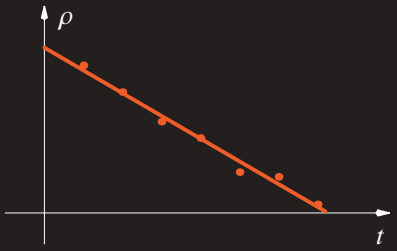


Figure 22.16
The data in Table 22.9 along with the regression line $\rho = 9.858 - 0.03812t$.

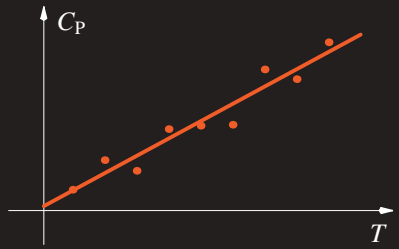


Figure 22.17
The data in Table 22.10 along with the regression line $C_p = 26.64 + 0.007135\,T$.

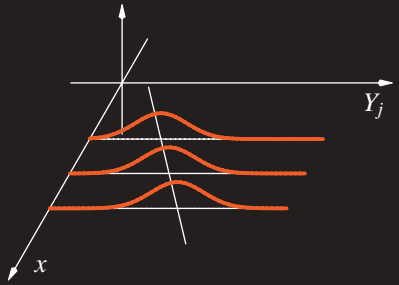


Figure 22.18
An illustration of the assumption that each random variable Y_j is normally distributed with mean $\mu = \alpha + \beta\, x$ and variance σ^2, which is independent of x.