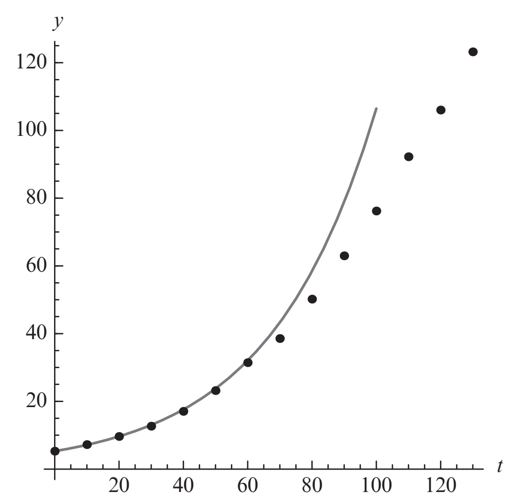

FIGURE 3.1 A population with limited resources cannot grow exponentially forever.

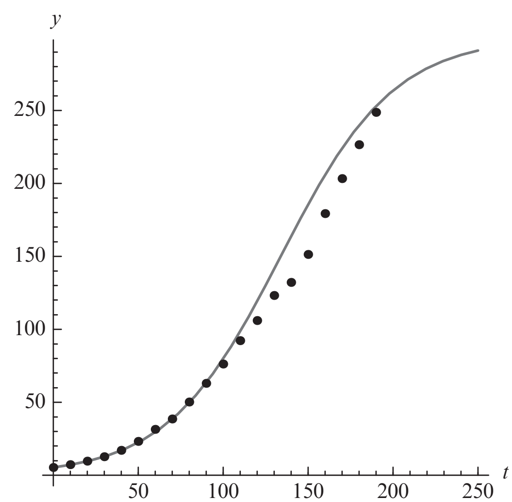

FIGURE 3.2 With these parameter values, the upper limit on the population of the United States is approximately 300 million.

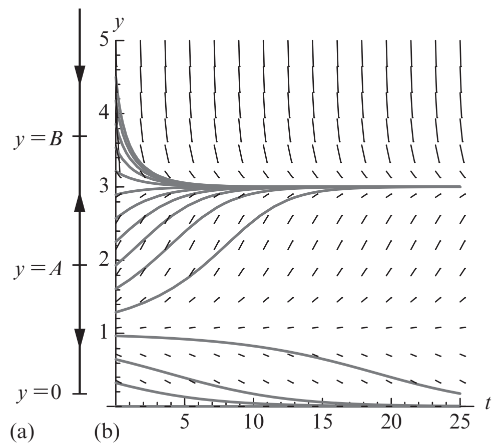

FIGURE 3.3 (a) Phase line for $dy/dt = -r(1 - (1/A)y)(1 - (1/B)y)y$. (b) Several solutions together with the slope field for $dy/dt = -0.25(1 - y)(1 - y/3)y$. The phase portrait shows that all nontrivial solutions other than if $y_0 = 1$, $y(t) = 1$. If $y_0 < 1$, then $\lim_{t\to\infty} y(t) = 0$. If $y_0 > 1$, then $\lim_{t\to\infty} y(t) = 3$.

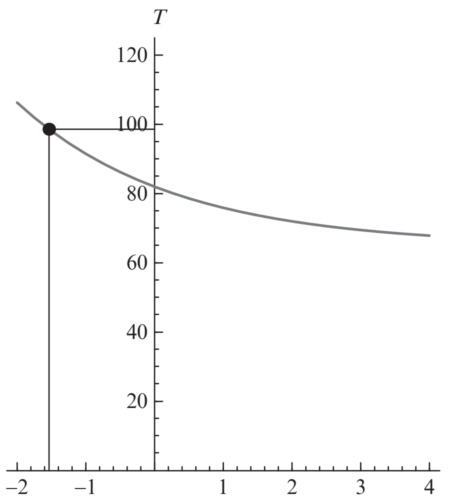

FIGURE 3.4 Graph of $T(t) = 17(7/17)^{t/2} + 65$.

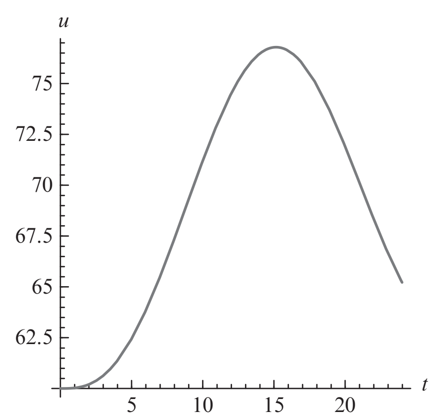

FIGURE 3.5 Modeling the temperature in a building over the course of a 24-h day.

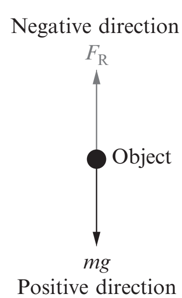

FIGURE 3.6 Force diagram.

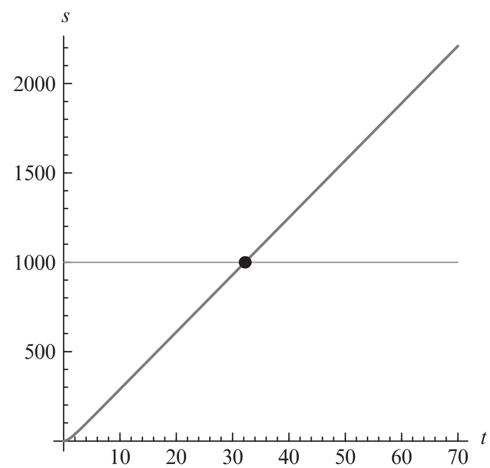

FIGURE 3.7 Graph of $s(t) = 32t + 30e^{-t} - 30$.

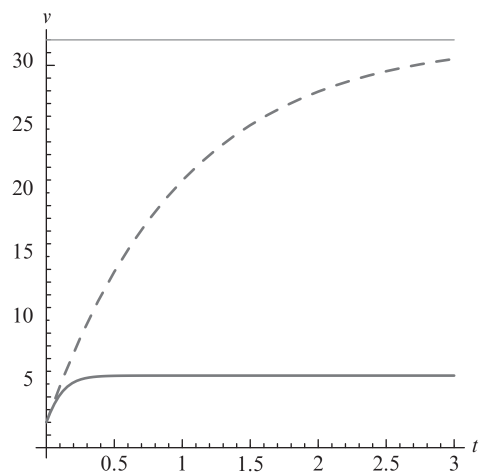

FIGURE 3.8 The velocity functions from Example **??** (dashed) and Example **??**. Notice how the different forces due to air resistance affect the velocity of the object.

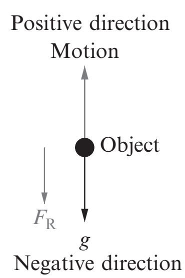

FIGURE 3.9 By drawing a force diagram, we see that g and F_R are in the negative direction.

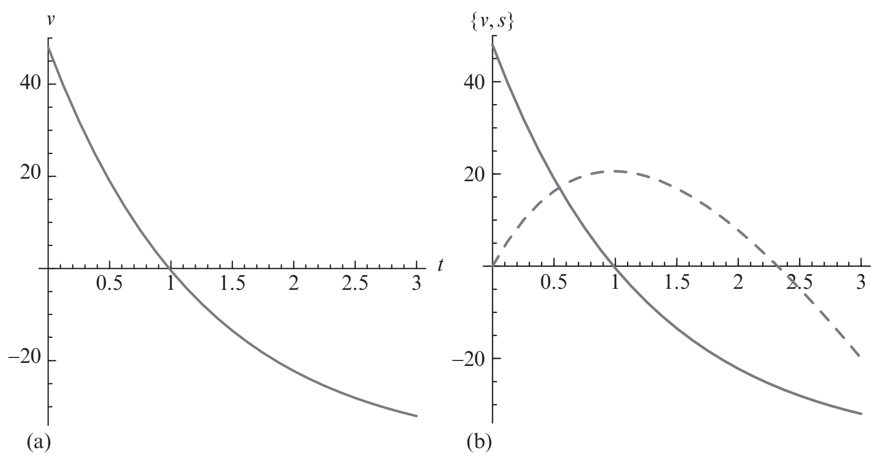

FIGURE 3.10 (a) Graph of $v(t) = 88e^{-4t/5} - 40$. (b) Graph of $v(t)$ together with $s(t) = 110 - 40t - 110e^{-4t/5}$ (dashed).

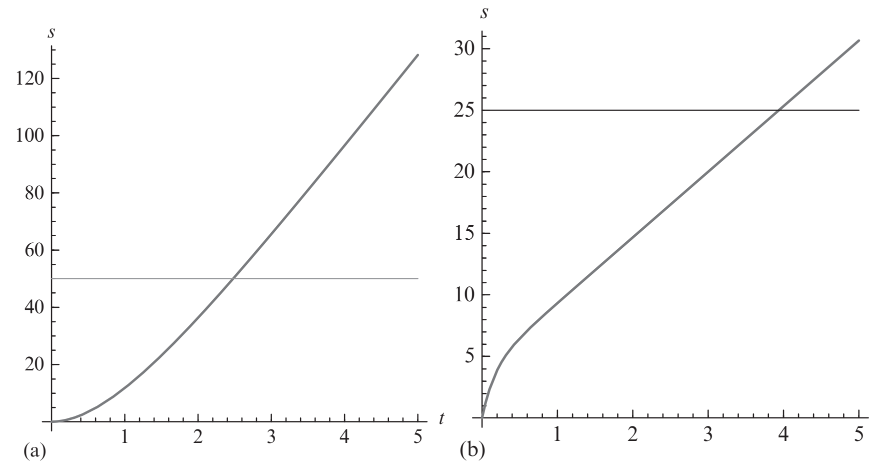

FIGURE 3.11 (a) Graph of $s(t) = 32e^{-t} + 32t - 32$. (b) Graph of $s(t) = 3.99722 - 3.9972e^{-6t} + \frac{16}{3}t$.

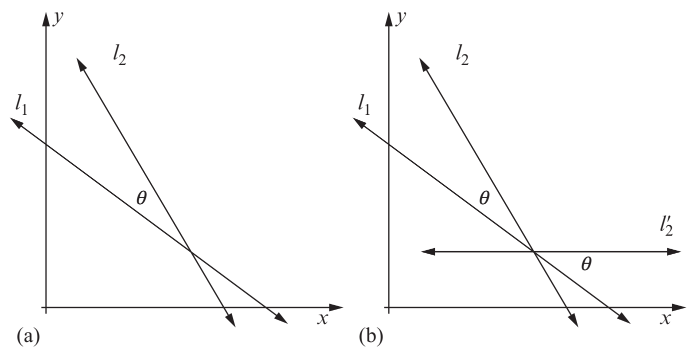

FIGURE 3.12 (a) Calculating the angle of intersection of two non-parallel lines. (b) Drawing the parallel can help compute the angle.

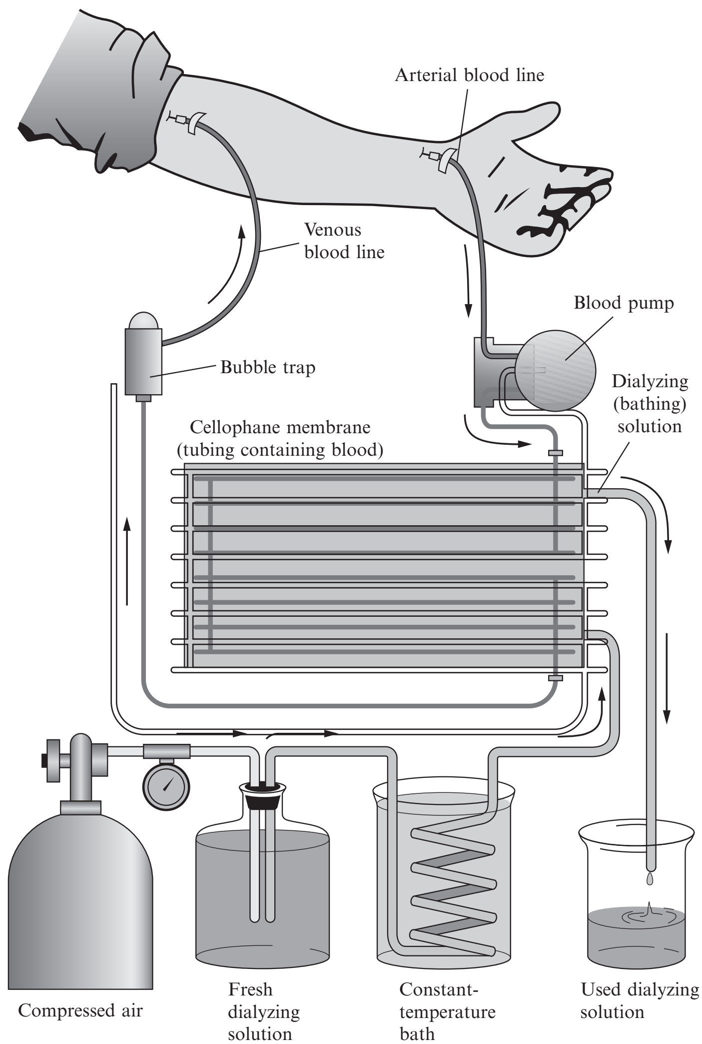

FIGURE 3.13 Diagram of a kidney dialysis machine.

TABLE 3.1 Half-Lives of Various Nuclides

Element	Nuclide	Half-Life	Element	Nuclide	Half-Life
Aluminum	^{26}Al	7.4×10^5 years	Polonium	^{209}Po	100 years
Beryllium	^{10}Be	1.51×10^6 years	Polonium	^{210}Po	138 days
Carbon	^{14}C	5730 years	Radon	^{222}Rn	3.82 days
Chlorine	^{36}Cl	3.01×10^5 years	Radium	^{226}Ra	1700 years
Iodine	^{131}I	8.05 days	Thorium	^{230}Th	75,000 years
Potassium	^{40}K	1.2×10^9 years	Uranium	^{238}U	4.51×10^9 years

TABLE 3.2 U.S. Population and Values of $y(t)$

Year (*t*)	Actual Population (in millions)	Value of $y(t) =$ $5.3\,e^{0.03t}$	Year (*t*)	Actual Population (in millions)	Value of $y(t) =$ $5.3\,e^{0.03t}$
1800 (0)	5.30	5.30	1870 (70)	38.56	43.28
1810 (10)	7.24	7.15	1880 (80)	50.19	58.42
1820 (20)	9.64	9.66	1890 (90)	62.98	78.86
1830 (30)	12.68	13.04	1900 (100)	76.21	106.45
1840 (40)	17.06	17.60	1910 (110)	92.23	143.70
1850 (50)	23.19	23.75	1920 (120)	106.02	193.97
1860 (60)	31.44	32.06	1930 (130)	123.20	261.83

TABLE 3.3 U.S. Population and Values of $y(t)$

Year *(t)*	Actual Population (in millions)	Value of *y(t)*	Year *(t)*	Actual Population (in millions)	Value of *y(t)*
1800 (0)	5.30	5.30	1900 (100)	76.21	79.61
1810 (10)	7.24	7.11	1910 (110)	92.23	98.33
1820 (20)	9.64	9.52	1920 (120)	106.02	119.08
1830 (30)	12.68	12.71	1930 (130)	123.20	141.14
1840 (40)	17.06	16.90	1940 (140)	132.16	163.59
1850 (50)	23.19	22.38	1950 (150)	151.33	185.45
1860 (60)	31.44	29.44	1960 (160)	179.32	205.82
1870 (70)	38.56	38.42	1970 (170)	203.30	224.05
1880 (80)	50.19	49.63	1980 (180)	226.54	239.78
1890 (90)	62.98	63.33	1990 (190)	248.71	252.94

TABLE 3.4 Units Useful in Solving Problems Associated with Newton's Second Law of Motion

	English	International
Mass	Slug (1b s^2/ft.)	Kilogram (kg)
Force	Pound (1b)	Newton (m kg/s^2)
Distance	Foot (ft.)	Meter (m)
Time	Second (s)	Second (s)

Painting	**^{210}Po Concentration (dpm/g of Pb)**	**^{226}Ra Concentration (dpm/g of Pb)**	$\frac{\mathbf{1-Ra}}{\mathbf{Po}}$
Washing of Feet	12.6	0.26	0.98
Woman Reading Music	10.3		0.97
		0.30	
Woman Playing Mandolin	8.2	0.17	0.98
Woman Drinking	8.3	0.1	0.99
Disciples of Emmaus		0.8	0.91
Boy Smoking	4.8	0.31	0.94
Lace Maker	1.5	1.4	0.07
Laughing Girl	5.2	6.0	−0.15