**Solution 17.10**

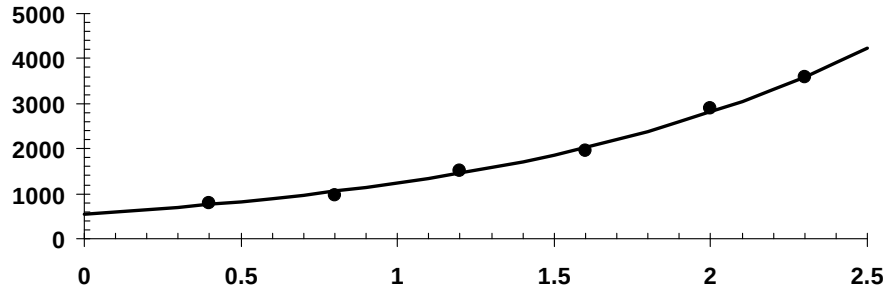
For the data from Prob. 17.9, we regress $\log_{10}(y)$ versus $x$ to give

$$\log_{10} y = 2.737662 + 0.355536x$$

Therefore, $\alpha_5 = 10^{2.737662} = 546.5909$ and $\beta_5 = 0.355536$, and the base-10 exponential model is

$$y = 546.5909 \times 10^{0.355536x}$$

The model and the data can be plotted as




This plot is identical to the graph that was generated with the base-$e$ model derived in Prob. 17.9. Thus, although the models have a different base, they yield identical results.

The relationship between $\beta_1$ and $\beta_5$ can be developed as in

$$e^{-\beta_1 t} = 10^{-\beta_5 t}$$

Take the natural log of this equation to yield

$$-\beta_1 t = -\beta_5 t \ln 10$$

or

$$\beta_1 = 2.302585\beta_5$$

This result can be verified by substituting the value of $\beta_5$ into this equation to give

$$\beta_1 = 2.302585(0.355536) = 0.818651$$

This is identical to the result derived in Prob. 17.9.

Copyright © McGraw-Hill Education. This is proprietary material solely for authorized instructor use. Not authorized for sale or distribution in any manner. This document may not be copied, scanned, duplicated, forwarded, distributed, or posted on a website, in whole or part.