Solution 17.13

Linearization: First the natural log can be applied to give

$$\ln x = \frac{y-b}{a}$$

Multiply both sides by *a*

$$a \ln x = y - b$$

Rearrange to give

$$y = a \ln x + b$$

Therefore, a plot of *y* versus ln *x* should yield a straight line with a slope of *a* and an intercept of *b*.

x	***y***	**ln *x***	**(ln *x*)^2**	**ln *x* × *y***
1	0.5	0	0	0
2	2	0.693147	0.480453	1.386294
3	2.9	1.098612	1.206949	3.185976
4	3.5	1.386294	1.921812	4.85203
5	4	1.609438	2.59029	6.437752
Σ	**12.9**	**4.787492**	**6.199504**	**15.86205**

$$a = \frac{n\Sigma x_i y_i - \Sigma x_i \Sigma y_i}{n\Sigma x_i^2 - (\Sigma x_i)^2} = \frac{5(15.86205) - 4.787492(12.9)}{5(6.199504) - (4.787492)^2} = 2.172917$$

$$b = \bar{y} - a_1 \bar{x} = \frac{12.9}{5} - 2.172917 \frac{4.787492}{5} = 0.499436$$

$$x = e^{(y-0.499436)/2.172917}$$

$$y = 2.172917 \ln x + 0.499436 = 2.172917 \ln(2.6) + 0.499436 = 2.575683$$