Outline
1. Regression results in R.
2. Non-linear relationship — how to detect it.
3. Re-expression.

Suppose we wish to fit a function \( y = b_0e^{b_1x} \) to the data. This equation transforms to
\[
\ln y = \ln b_0 + b_1x
\]
Linear regression with data \((x_i, \ln y_i)\) finds the constants \(b_1\) and \(\ln b_0\). (Note that this does not minimize the sums of squares of residuals in the original relationship.)

In general, the goal is to transform the data \((x, y)\) to \((g(x), h(y))\) so that the equation \(y = f(x)\) is equivalent to \(h(y) = b'_0 + b'_1g(x)\) where \(b'_0, b'_1\) are known functions of \(b_0\) and \(b_1\).

Homework - due Thursday, February 14
1. Find a transformation that transforms the following nonlinear equations \(y = f(x)\) (that depend on parameters \(b_0\) and \(b_1\)) to linear equations \(g(y) = b'_0 + b'_1h(x)\).
   (a) \(y = \frac{b_0}{b_1 + x}\)
   (b) \(y = \frac{x}{b_0 + b_1x}\)
   (c) \(y = \frac{1}{1 + b_0e^{b_1x}}\)

2. The R dataset Puromycin gives the rate of reaction as a function (in counts/min/min) of concentration of an enzyme (in ppm) for two different substrates - one treated with Puromycin and one not treated. The biochemistry suggests that these two variables are related by
\[
\text{rate} = b_0 \frac{\text{conc}}{b_1 + \text{conc}}
\]
Find good approximations to \(b_0, b_1\) by re-expressing the relationship as a linear one.

Useful R
\[
\text{> xyplot(BUCHANAN~BUSH, data=Florida, subset=(BUCHANAN<2000))}
\]
\[
\text{> xyplot(Seconds~Meters, data=mt, scale=list(x=list(log=T), y=list(log=T)))}
\]