# Homework 4

Download "hw_04.xlsx" to do your assignment.

1.  Fit the data in "problem 1" on the worksheet to a fourth order polynomial using a trendline. Show the equation in scientific notation with 2 decimals. Also display the $R^2$ value on the plot.

2.  Use a trendline to find the values of A and E in the rate equation $r = A*exp(-E/T)$, where r and T data are given on worksheet "problem 2." You will need to modify this equation to get it in a form suitable for use with one of the built-in trendline forms.

3.  The worksheet "Problem 3" contains data for the response of a *first order system with time delay*. Such data is used to create control devices to keep operations running correctly. (You will learn about this in ChEn 436, Process Control and Dynamics.)

    a.  Find the constants, $\tau$ and $\theta$, in the equation

    $$y(t) = 5\left[1 - \exp\left(-\frac{(t-\theta)}{\tau}\right)\right] S(t-\theta)$$

    where

    $$S(t-\theta) = \begin{cases} 0 & when\ t < \theta \\ 1 & when\ t \geq \theta \end{cases}$$

    best fit the process control data, y(t).

    b.  Make a plot showing the data (as points) and the fit (as a line).

    c.  Which of the functions available with Excel's trendline feature best fit the data? How many constants are used to achieve this fit? What is its $R^2$-value?

    Hints:
    *   You will need to use an *if* function for this problem.