Least Squares Fitting
Due: Wednesday, December 6.

In this exercise, you are to fit the data in the HW13 Assignments Submission Folder (hw13.dat) using the least-squares algorithm. The question we would like to answer is which fitting function fits the data best:

$$f(x) = a + b\,x\,, \qquad\qquad g(x) = c\,, \qquad\qquad \text{or } h(x) = d\,x\,,$$

where a, b, c, and d are constants to be determined by fitting. The least-squares expressions for fitting data using $f(x)$ are derived in your text. You will need to derive the least-squares expressions for fitting data using $g(x)$ and $h(x)$. To decide which function is best, we will use the *reduced chi-squared* χ^2_{red} *test* as defined in your text.

- Use the `Matlab` function `linfit.m` to determine the fit to the data with $f(x)$.

- Write a `Matlab` function similar to `linfit.m` that implements your expressions for fitting the data using $g(x)$. Write another function for fitting using $h(x)$. *Simply setting $a = 0$ or $b = 0$ in `linfit.m` to obtain $h(x)$ or $g(x)$ is incorrect.* Your functions do not need to calculate the uncertainties in the parameters (as is done in `linfit.m`), but they do need to calculate the value of χ^2_{red}. Use your functions to fit the data.

- Make a plot of the data, including error bars. Overlay the curves obtained from the three fitting functions.

To submit HW13 to D2L for grading:

1. Deposit a copy of your functions and the plot you generated (in JPEG format, with axes labeled) in your HW13 Assignments Submission Folder. There is no need to submit the original `linfit.m`.

2. Complete the HW13 Survey.

This homework is worth 25 points.