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The getdata\* family of functions for MATLAB were created to help plot the measured system response and to help verify the system pole locations. The functions can be used with underdamped, critically damped, and overdamped second order systems as well as first order systems. The functions are available in the X:\2.003 course locker on the MECHENG domain. The files can be accessed by either copying the files to the individual user's directory or with the addpath function.

### **[t,y]=Getdata(fname)**

1. This function plots the data in the given file (specified in single quotes e.g. fname='tek00001.dat').
2. It also outputs two vectors: a time vector and a data vector. These vectors can then be operated on, and modification of the plot can be made based on these two vectors.
3. The Tektronix scope saves the data (in Mathcad format) with 4 initial header values. They are
  - The number of data points
  - The time per sample interval
  - The trigger location
  - The trigger offsetThe last two items are not used in this function.
4. Students can use the plot produced by this function to estimate the two poles of a second-order system, or equivalently, the damping ratio and natural frequency.

### **[t,y,y\_final]=Getdata3(fname,p1,p2)**

1. This function plots the data in the given file (specified in single quotes, eg. fname='tek00001.tek').
2. The function will also plot the step response of the system constructed from values of two poles p1 and p2 that should be estimated from the response plotted by Getdata(fname). Students can then judge how close these two plots are and decide whether any modification of the two poles should be made in order to produce a closer match. For complex conjugate poles, a decay envelope is plotted in addition to the simulated time response.

3. The function will also simulate first order responses, if p1 is specified and p2 left out.
4. The user will be asked to click on the initial data point and on a data point equal to the final value. These two data points are used to scale the plot and the simulated response. Matching the simulated response to the measured response is simplified by picking the first peak or valley as the initial data point.

**[t,y,y\_final]=Getdata4(fname,p1,p2,yfinal)**

1. This function is the same as getdata3.m, except you can enter the final value of the response, instead of clicking.
2. This feature is useful when a system is lightly damped and it takes a long time for the system to settle down: however, we know the final value of the response from theory.