1. Apply a zero-mean unit-variance random input to your plant. Obtain the output by simulation. Compute the variance of the output. (4pts)
2. Add a zero-mean independent random sequence, also independent of the input, as output noise. Investigate three different noise levels, so that the standard deviation of the noise is 0.01x, then 0.03x then 0.10x the standard deviation of the noise-free output. (4pts)
3. Write a recursive data-collection least squares algorithm and identify the system parameters under each of the three different noises. Use at least 2000 samples. Compare the results and comment on your findings. (4pts)
4. Convert your program into a recursive estimation LS (that is, compute the estimates at each sample), with forgetting factor. Run the program under each of the three noise levels, each time with three different forgetting factor values: 1; 0.99; 0.9 (a total of 9 experiments). Plot the estimates for the first 100 samples, then for samples 1901 through 2000. Compare the results and comment on your findings. (4pts)
5. Choose an "unbiased" method from the Matlab Toolbox (recommendation: use the IV4 method). Identify your parameters at the three different noise levels and compare the results to those in 3. above. (4pts)

Note: Be prepared to see increasingly poor identification results as you increase the size of the noise. Also, expect increasing variation in the estimates with forgetting.