

**Department of Chemical Engineering**  
**IIT Bombay**  
**CL692, Digital Control**  
**Assignment 6**  
**Handed out on: 6 Sep 2006**  
**To be completed by: 11 Sep 2006**

1. This problem is concerned with the conditions for uniqueness of parameter estimation

- (a) Consider the noise process,  $y_1$  given by,

$$y_1(n) = \xi(n) - 3\xi(n-1) + 1.25\xi(n-2)$$

where,  $\xi$  is our usual white noise process. Generate input-output data in Matlab. Starting from the data, using an appropriate Matlab function, determine the model parameters. Does your model prediction agree with the given parameters?

- (b) Repeat this exercise with the noise process,  $y_2$ , given by,

$$y_2(n) = \xi(n) - 0.9\xi(n-1) + 0.2\xi(n-2)$$

How does Matlab fare now? Compare the current result of Matlab with the one you calculated above? What do you observe? Can you explain this behaviour?

Hint: You may want to look at

- (a) how the parameters are calculated - look at your recent test paper
- (b) look at the formula for  $\gamma$  using convolution approach
- (c) look at the formula for Z-transform of  $\gamma$