```
// T11simReg4.sce
// MULTIVARIATE REGRESSION MODEL AND BAYESIAN ESTIMATION
// Experiments
// - change parameters of the model
// - change the input signal
// - try to increase the model order to 2
// --------------------------------------------------------------------
exec("ScIntro.sce",-1), mode(0)


// PARAMETERS                                                        // 1
nd=100;                            // length of data                // 2
a1S=[.8 .2                                                          // 3
     .1 .6];                       // parameters at y(t-1)          // 4
b0S=[1 -.5]';                      // parameters at u(t)            // 5
b1S=[.5 .1]';                      // parameters at u(t-1)          // 6
kS=[-5 3]';                        // constant (model absolute term) // 7
sS=.1*eye(2,2);                    // noise std                     // 8
ny=max(size(a1S));                 // number of y-variables         // 9
                                                                    // 10
y(1,:)=[1 -1];                     // initial conditions for output // 11
u=signal(nd,1,.1);                 // input                         // 12
                                                                    // 13
// TIME LOOP                                                        // 14
```

```
thS=[b0S a1S b1S kS]';                  // matrix of parameters          // 15
V=zeros(7,7);                           // initial statistics            // 16
ka=0;                                                                    // 17
for t=2:nd                                                               // 18
  ps=[u(t) y(t-1,:) u(t-1) 1]';    // regression vector                  // 19
  y(t,:)=thS'*ps+sS*rand(2,1,'n'); // simulation                         // 20
  Ps=[y(t,:) ps']';                     // extended regression vector    // 21
  V=V+Ps*Ps';                           // update of statistics          // 22
  ka=ka+1;                                                               // 23
end                                                                      // 24
Vy=V(1:ny,1:ny);                        // partitioning                  // 25
Vyp=V(ny+1:$,1:ny);                     //   of informtion               // 26
Vp=V(ny+1:$,ny+1:$);                    //   matrix                      // 27
thE=inv(Vp)*Vyp;                        // parameter estimates           // 28
                                                                         // 29
// RESULTS                                                               // 30
set(gcf(),"position",[700 100 600 500])                                  // 31
subplot(211),plot(1:nd,u),title('Input')                                 // 32
subplot(212),plot(1:nd,y),title('Output')                                // 33
disp('The simulated and estimated parameters are',[thS,thE])             // 34
```

Description of the program

- Rows 3–8 set parameters of the model

- Row 11 sets the initial conditions

- Row 12 generates input signal

- Rows 16–18 are initial statistics (no prior information)

- Rows 18–24 perform the time loop

  - 19: construction of regression vector
  - 20: simulation
  - 21: construction of extended regression vector
  - 22–23: update of statistics

- Rows 25–27 divides the information matrix

- Row 28 computes point estimates of the parameters