

Lab Assignments #1B

What to do ?

- Write Matlab code plot results (label axis and titles)
- Create a short report including plots

Discrete-time signal

5. Consider difference equation

$$y[n] = 1.97 y[n-1] - y[n-2]$$

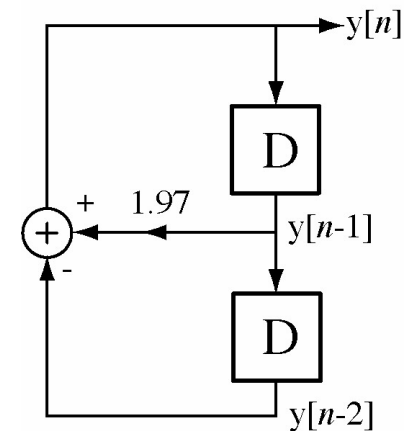
We can use Matlab to solve this equation by iteration using a computer

```

yn = 1 ; yn1 = 0 ; ← Initial Conditions
while 1,
    yn2 = yn1 ; yn1 = yn ; yn = 1.97*yn1 - yn2 ;
end
    
```

We can describe the system with a **block diagram**.

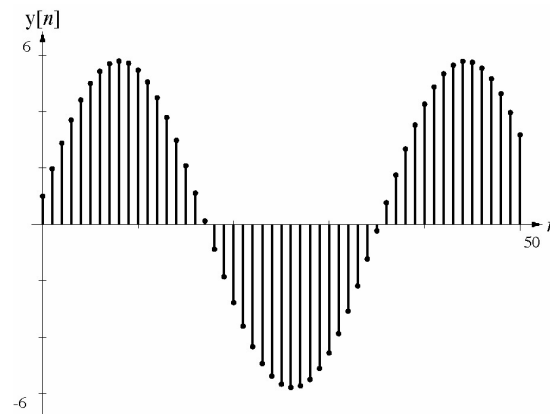
(“D” means delay one unit in discrete time)



A. Use Matlab to generate the discrete function

$$y[n] = 1.97y[n-1] - y[n-2]$$

With the initial conditions $y[1] = 1$ and $y[0] = 0$ the response is



Generate the discrete function

$$y[n] = 1.90y[n-1] - y[n-2]$$

Plot result (using stem command) with the initial conditions $y[1] = 1$ and $y[0] = 0$

Report the change in the generated function.

Feedback System

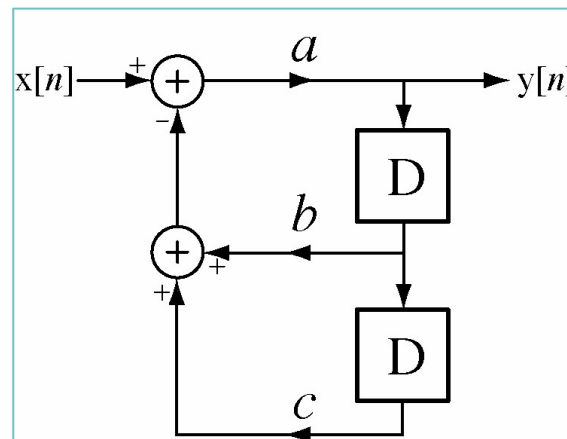


Consider difference equation of a second-order system.

The response $y[n]$ is fed back through two delays and gains b and c and combined with the excitation $x[n]$.

Different values of a , b and c can create dramatically different responses to the same excitation.

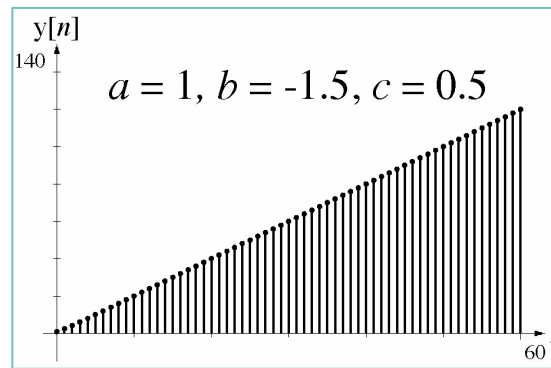
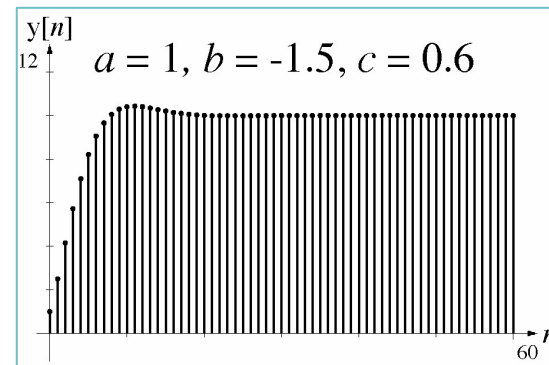
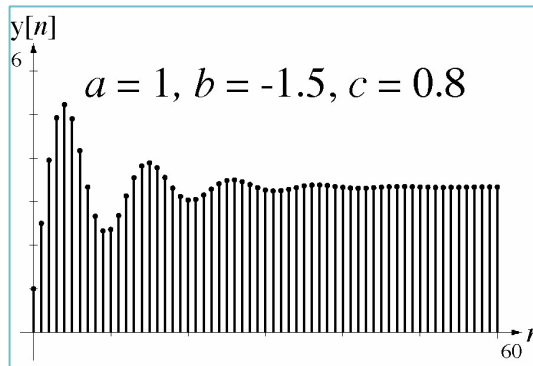
- Use Matlab to generate the discrete feedback systems with different parameters a , b and c .
- Report change in the generated functions.



Feedback System

Use Matlab to generate the discrete feedback systems with different parameters a , b and c , plot results.

Example of responses to an excitation that changes from 0 to 1 at $n = 0$.



- Report change in the generated functions.