

Problem_7_15_1

October 1, 2021

1 7.15 b

To generate a signal u of length $m = 50$, with each entry a random value that is either -1 or +1

```
[ ]: u = rand([-1,1], 50)
      print(u)
```

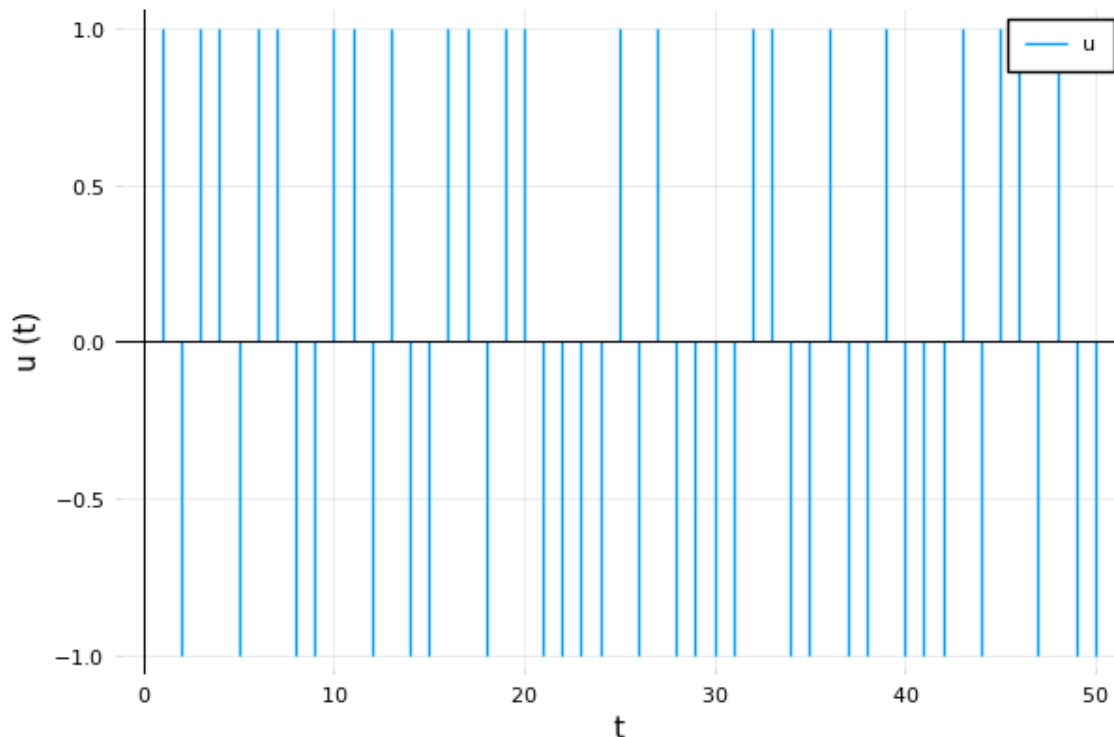
```
[1, -1, 1, 1, -1, 1, 1, -1, -1, 1, 1, -1, 1, -1, -1, 1, 1, -1, 1, 1, -1, -1, -1,
-1, 1, -1, 1, -1, -1, -1, -1, 1, 1, -1, -1, 1, -1, -1, 1, -1, -1, -1, 1, -1, 1,
1, -1, 1, -1, -1]
```

Plot u

```
[ ]: using Plots
      Plots.pyplot()
      plot(u, framestyle = :zerolines, st = :sticks, label = "u", xlabel = "t",
            ↪ylabel = "u (t)")
```

```
(process:18960): GLib-GIO-WARNING **: 07:43:03.595: Unexpectedly, UWP app
`AcerIncorporated.PredatorSenseV30_3.0.3136.0_x64__48frkmn4z8aw4' (AUMId
`AcerIncorporated.PredatorSenseV30_48frkmn4z8aw4!CentenialConvert') supports 1
extensions but has no verbs
```

```
[ ]:
```



Create $c = (1, 0.7, -0.3)$

```
[ ]: c = [1, 0.7, -0.3]
```

```
[ ]: 3-element Vector{Float64}:
```

```
 1.0
 0.7
-0.3
```

$y = c * u$

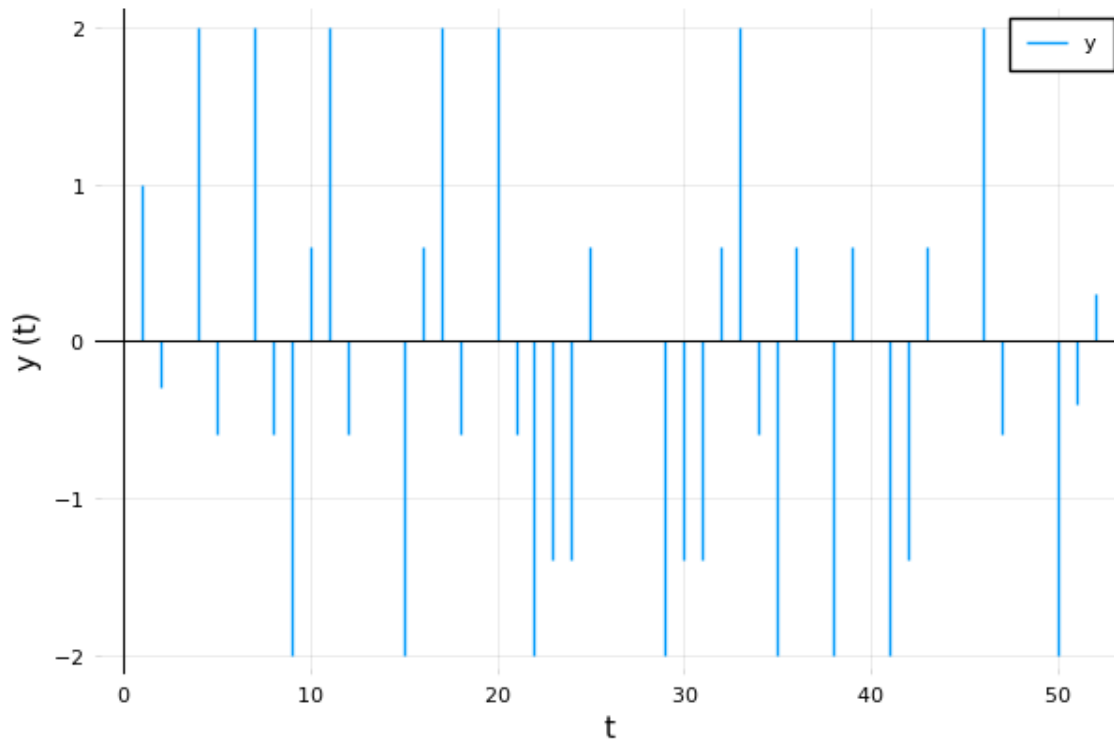
```
[ ]: using DSP
      y = conv(c, u)
      print(y)
```

```
[0.9999999999999999, -0.300000000000000016, 0.0, 2.0, -0.6,
8.326672684688674e-17, 2.0, -0.60000000000000001, -2.0, 0.60000000000000001, 2.0,
-0.60000000000000001, 1.1102230246251565e-16, -5.551115123125783e-17, -2.0,
0.60000000000000002, 2.0, -0.60000000000000001, 1.1102230246251565e-16, 2.0,
-0.5999999999999999, -1.9999999999999998, -1.4, -1.4, 0.5999999999999999,
1.1102230246251565e-16, 0.0, 1.1102230246251565e-16, -1.9999999999999998, -1.4,
-1.40000000000000004, 0.60000000000000001, 2.0, -0.6, -2.0, 0.60000000000000001,
-1.1102230246251565e-16, -2.0, 0.60000000000000001, -1.1102230246251565e-16,
-2.0, -1.4, 0.5999999999999996, 0.0, 0.0, 2.0, -0.5999999999999996, 0.0, 0.0,
-2.0, -0.400000000000000013, 0.30000000000000004]
```

Plot y

```
[ ]: plot(y, framestyle = :zerolines, st = :sticks, label = "y", xlabel = "t",  
↪ylabel = "y (t)")
```

```
[ ]:
```



$h = (0.9, -0.5, 0.5, -0.4, 0.3, -0.3, 0.2, -0.1)$

```
[ ]: h = [0.9, -0.5, 0.5, -0.4, 0.3, -0.3, 0.2, -0.1]
```

```
[ ]: 8-element Vector{Float64}:
```

```
 0.9  
-0.5  
 0.5  
-0.4  
 0.3  
-0.3  
 0.2  
-0.1
```

$z = h * y$

```
[ ]: z = conv(h, y)  
print(z)
```

```
[0.9, -0.7700000000000004, 0.6500000000000001, 1.25, -1.199999999999997,
```

```

0.9099999999999996, 0.9899999999999999, -0.8600000000000005,
-1.2499999999999996, 1.0199999999999998, 1.0200000000000005, -1.16,
1.0400000000000005, -0.6400000000000001, -1.4800000000000004, 1.08, 1.02,
-0.7599999999999999, 0.5200000000000005, 1.48, -1.2800000000000002,
-0.9600000000000001, -0.84, -1.0400000000000003, 0.6199999999999997,
-0.4599999999999995, 0.72, -0.5799999999999997, -1.2799999999999998,
-0.5800000000000001, -1.3000000000000003, 1.2800000000000002,
0.7599999999999999, -0.5, -1.14, 0.9600000000000002, -0.7800000000000004, -1.22,
1.2200000000000004, -0.8399999999999996, -1.2200000000000002,
-0.7799999999999998, 0.9599999999999995, -0.7799999999999997,
0.5800000000000002, 1.6799999999999997, -1.3399999999999999, 1.0399999999999996,
-0.8399999999999995, -1.0200000000000005, -0.14, 0.04999999999999985,
0.13000000000000012, -0.22999999999999993, 0.36, -0.19, 0.029999999999999888,
0.1, -0.03000000000000011]

```

Plot z

```

[ ]: plot(z, framestyle = :zerolines, st = :sticks, label = "z", xlabel = "t",
↪ ylabel = "z (t)")

```

[]:

