

Problem_7_15

September 29, 2021

1 7.15 b

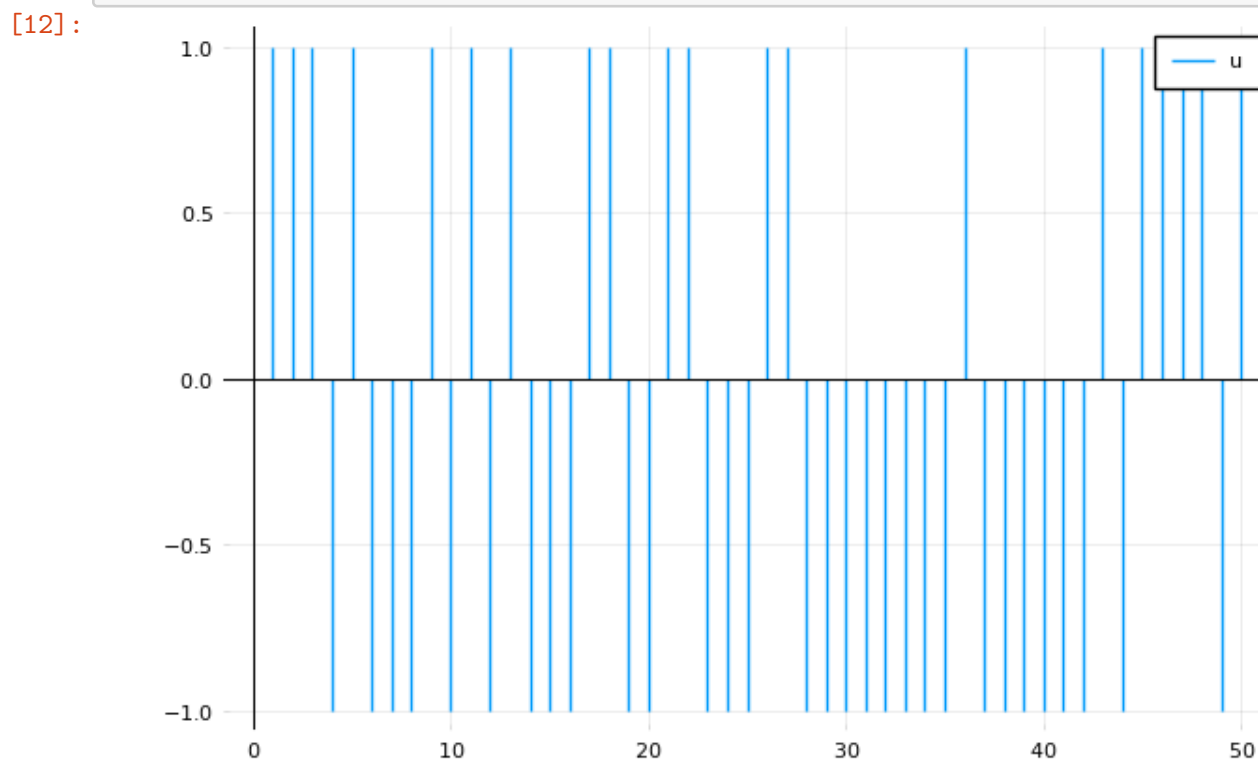
To generate a signal u of length $m = 50$, with each entry a random value that is either -1 or +1

```
[11]: 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]
```

Plot u

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



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

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

```
[13]: 3-element Vector{Float64}:
```

```
 1.0  
 0.7  
-0.3
```

$y = c * u$

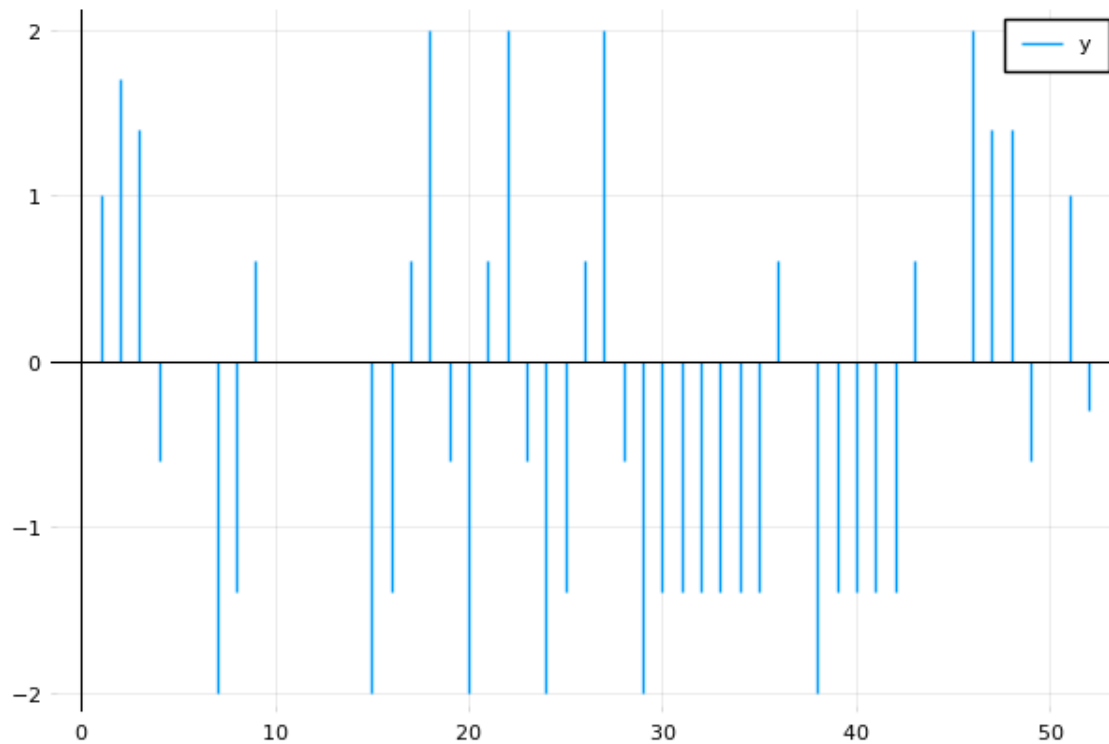
```
[14]: using DSP  
      y = conv(c, u)  
      print(y)
```

```
[1.0, 1.7, 1.4000000000000001, -0.6000000000000001, 0.0, 0.0, -2.0, -1.4, 0.6,  
-3.925231146709438e-17, 0.0, 1.1102230246251565e-16, 1.1102230246251565e-16,  
-2.220446049250313e-16, -2.0, -1.4, 0.6, 2.0, -0.6000000000000001, -2.0,  
0.6000000000000001, 2.0, -0.6000000000000001, -2.0, -1.4, 0.6000000000000003,  
2.0, -0.6, -2.0, -1.4000000000000001, -1.4, -1.4, -1.4, -1.399999999999997,  
-1.4, 0.6000000000000002, 2.220446049250313e-16, -1.999999999999998, -1.4,  
-1.4, -1.4, -1.399999999999997, 0.599999999999999, -1.1102230246251565e-16,  
-1.6653345369377348e-16, 2.0, 1.4000000000000001, 1.4, -0.599999999999999, 0.0,  
1.0, -0.30000000000000004]
```

Plot y

```
[15]: plot(y, framestyle = :zerolines, st = :sticks, label = "y")
```

```
[15]:
```



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

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

```
[16]: 8-element Vector{Float64}:
```

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

```
z = h * y
```

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

```
[0.9000000000000004, 1.0299999999999998, 0.9099999999999998,
-0.7900000000000003, 0.62, -0.6499999999999999, -1.4500000000000002,
-0.6199999999999997, 0.5300000000000004, -0.4599999999999996,
0.3200000000000003, -0.05999999999999964, 0.1999999999999998, -0.26, -1.54,
-0.3200000000000002, 0.23999999999999994, 1.6, -1.2799999999999998, -0.56,
0.6400000000000005, 1.0799999999999998, -0.9599999999999999,
```

```
-0.8200000000000001, -0.8999999999999998, 0.56, 1.14, -0.7599999999999998,
-0.8799999999999997, -1.1000000000000005, -0.9799999999999998,
-0.9800000000000001, -0.7799999999999998, -0.8399999999999996,
-1.0399999999999996, 1.02, -0.5799999999999994, -1.0799999999999996,
-0.6400000000000001, -1.1000000000000003, -0.7800000000000001,
-1.0399999999999996, 1.2199999999999995, -0.8400000000000001, 0.78,
1.4200000000000004, 0.7199999999999998, 1.2400000000000002, -1.08,
0.9799999999999995, -0.14, -0.13000000000000012, 0.13000000000000012, -0.23,
0.16000000000000006, -0.33000000000000007, 0.29000000000000015,
-0.15999999999999992, 0.029999999999999916]
```

Plot z

```
[18]: plot(z, framestyle = :zerolines, st = :sticks, label = "z")
```

[18]:

