2.34

Consider a LTI described by the following input-output relation:

y[n] = 3/4 y[n − 1] − 1/8 y[n − 2] + x[n].

(a) Find the system function H(z) and check whether the system is stable.

(b) Determine the impulse response h[n] of the system.

(c) Determine the step response s[n] of the system.

(d) Compute h[n] and s[n] for 0 ≤ n ≤ 10 using the formulas in (b) and (c) and

compare with the values obtained using the function filter.

```
b = [1]; a = [1,-0.75,0.125]; [R,p,C] = residuez(b,a)
```

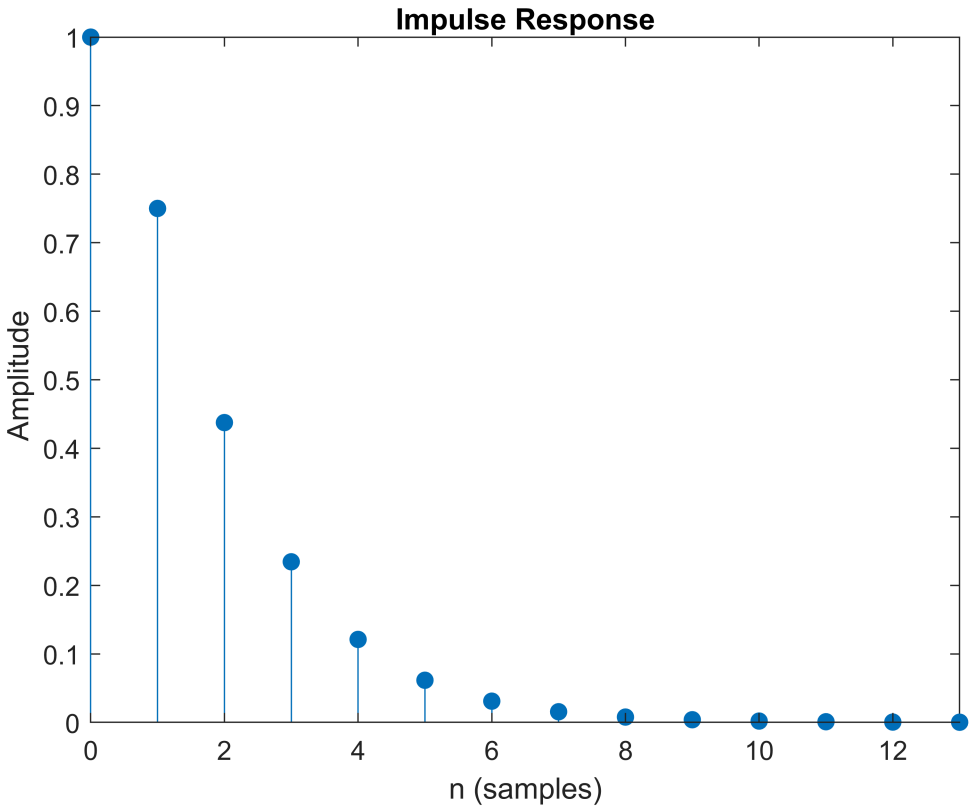
```
R = 2×1
     2
    -1
p = 2×1
    0.5000
    0.2500
C =

     []
```

```
[b,a] = residuez(R,p,C)
```

```
b = 1×2
     1     0
a = 1×3
    1.0000   -0.7500    0.1250
```

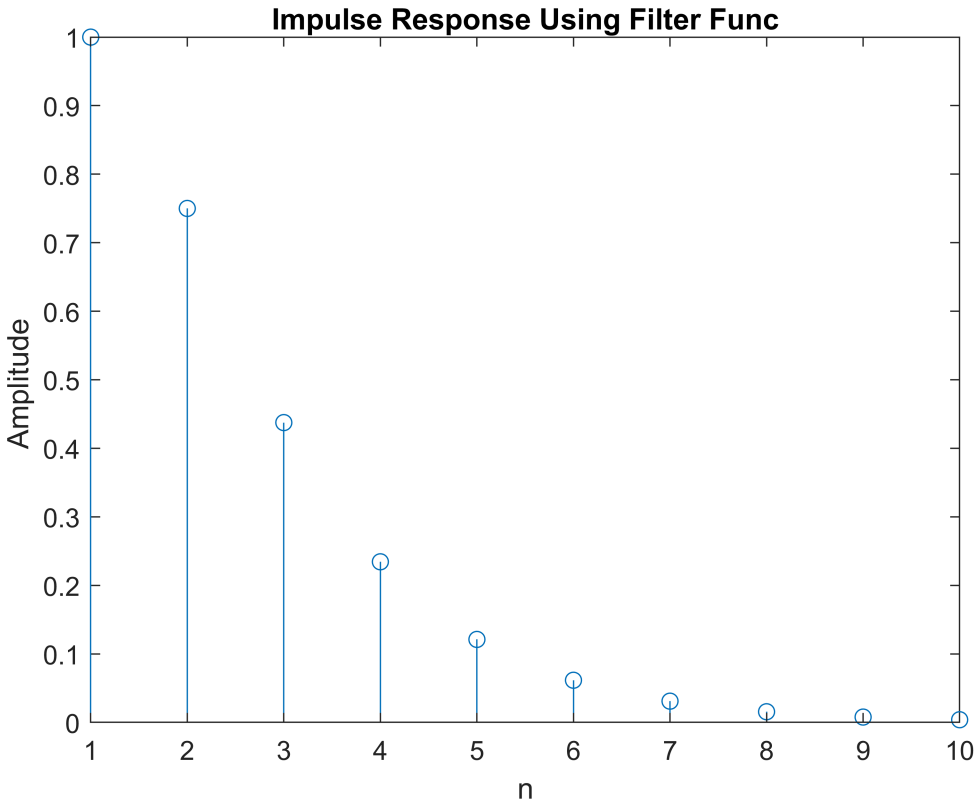
```
impz(b,a)
```




```
h = filter(b,a,[1 0 0 0 0 0 0 0 0 0])
```

```
h = 1×10
    1.0000    0.7500    0.4375    0.2344    0.1211    0.0615    0.0310    0.0156 ···
```

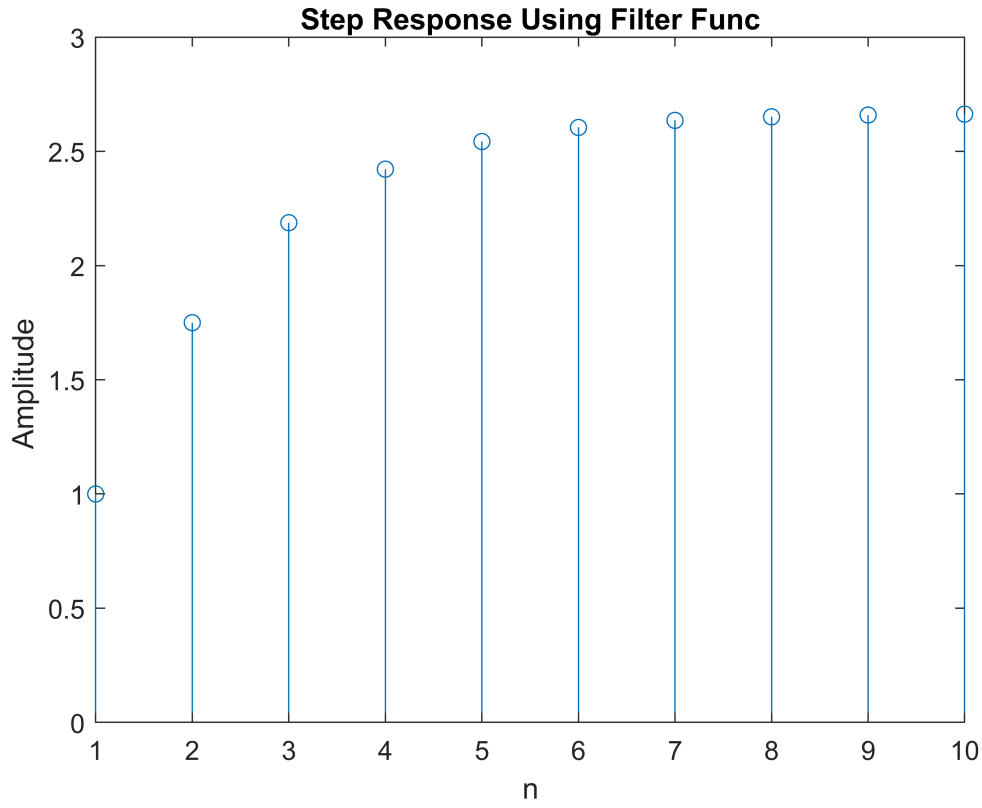
```
stem(h)
title('Impulse Response Using Filter Func') ; xlabel('n') ; ylabel('Amplitude ')
```



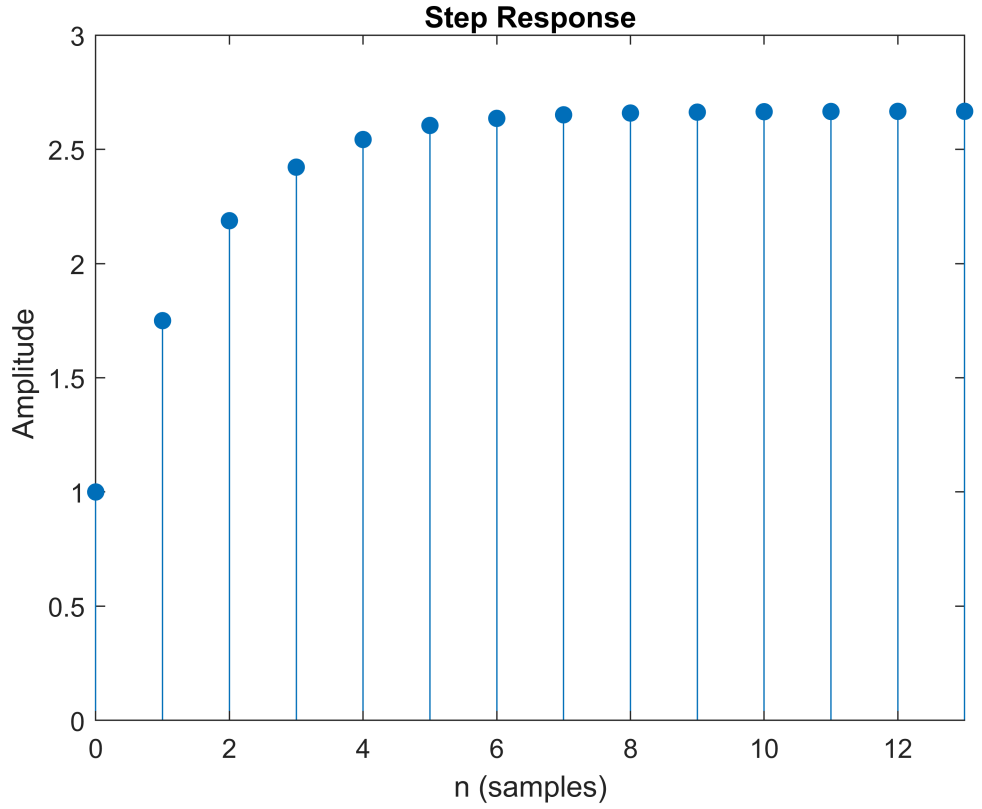

```
s = filter(b,a,ones(1,10))
```

```
s = 1×10
    1.0000    1.7500    2.1875    2.4219    2.5430    2.6045    2.6355    2.6511 ···
```

```
stem(s)
title('Step Response Using Filter Func') ; xlabel('n') ; ylabel('Amplitude ')
```


Step Response Using Filter Func
Amplitude
n
0
0.5
1
1.5
2
2.5
3
1
2
3
4
5
6
7
8
9
10

```
stepz(b,a)
```


Step Response
Amplitude
n (samples)
0
0.5
1
1.5
2
2.5
3
0
2
4
6
8
10
12