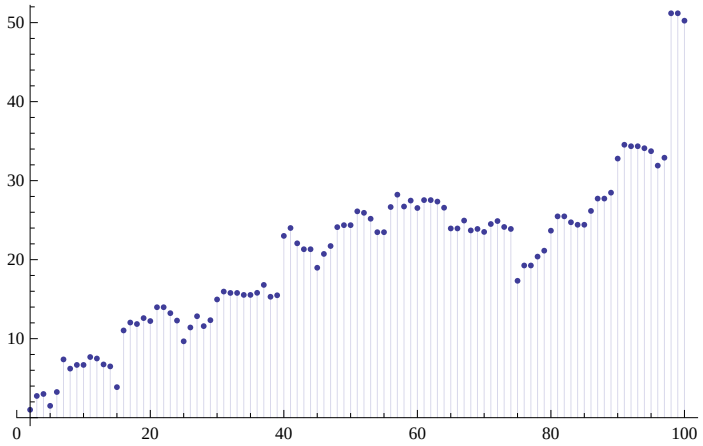
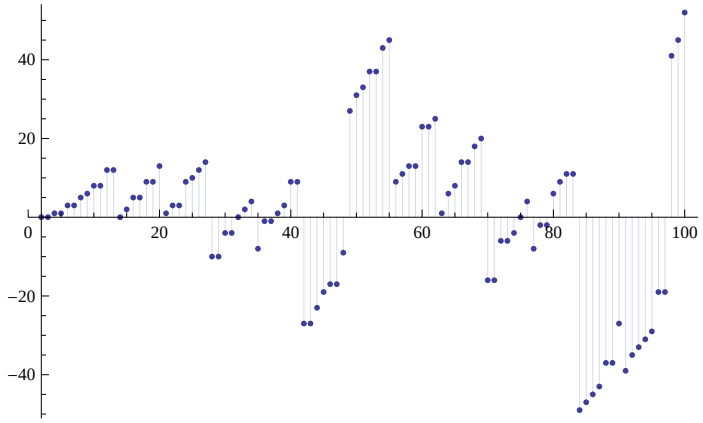
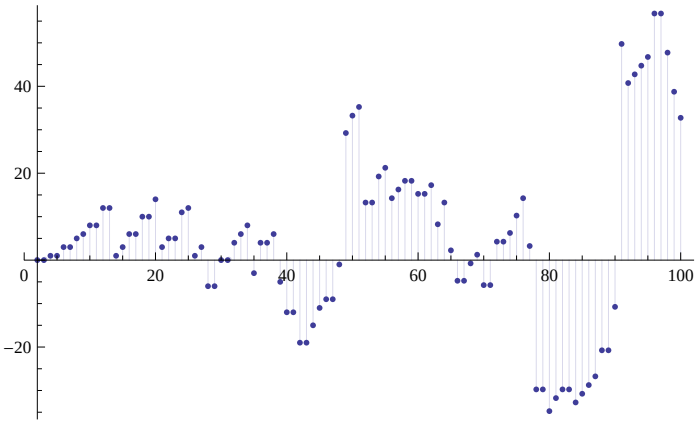
```
ClearAll["Global`*"]

tt3 := {-3 / 2, 1, 1, -3 / 4, 3 / 4}
tt2 := {-3 / 2, 1, 1, -3 / 2, 1}
tt := {-3 / 2, 1, -1 / 4, -1 / 4, 1}
Co[k_] := tt3[[Mod[k, 5] + 1]]

STa[vv_, n_] := Mod[n, vv] - Mod[(n - 1), vv]
ST[vv_, n_] := Co[n]
LAdd[vv_, n_] := Sum[ vv^k / k, {k, 1, Log[vv, n]}]
E1[vv_, n_, 0] := 1
E1[vv_, n_, k_] := E1[vv, n, k] = Sum[ ST[vv, j] E1[vv, Floor[n / j], k - 1], {j, 1, n}]
E2[vv_, n_, k_] := E2[vv, n, k] = Sum[ (-1)^(k - j) Binomial[k, j] E1[vv, n, j], {j, 0, k}]
P2[vv_, n_] := Sum[ (-1)^(k + 1) / k E2[vv, n, k], {k, 1, Log[2, n]}]
md[x_, y_] := y / 2 - y / Pi Sum[ Sin[ 2 Pi k x / y ] / k, {k, 1, 200}]
md2[x_, y_] := (y / 2 - y / Pi Sum[ Sin[ 2 Pi k x / y ] / k, {k, 1, 200}]) -
  (y / 2 - y / Pi Sum[ Sin[ 2 Pi k (x - 1) / y ] / k, {k, 1, 200}])
md3[x_, y_] := (y / 2 - y / Pi Sum[ Sin[ 2 Pi k x / y ] / k, {k, 1, 1000}]) -
  (y / 2 - y / Pi Sum[ Sin[ 2 Pi k (x - 1) / y ] / k, {k, 1, 1000}])

DiscretePlot[P2[5 / 2, n] + LAdd[5 / 2, n], {n, 2, 100}]
```



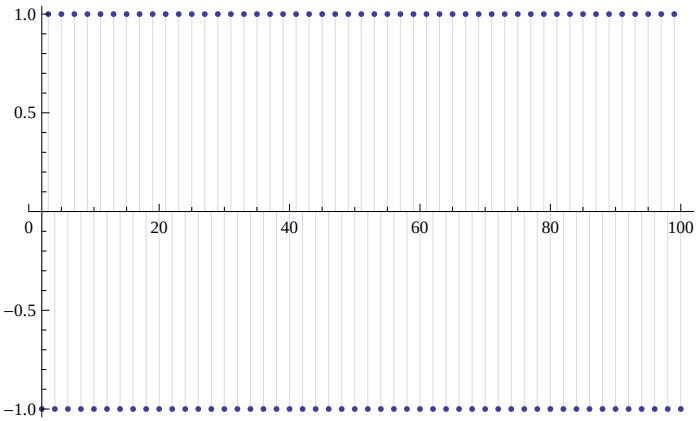

```
DiscretePlot[{E2[7, n, 2]}, {n, 2, 100}]
```



```
DiscretePlot[{E2[13 / 2, n, 2]}, {n, 2, 100}]
```



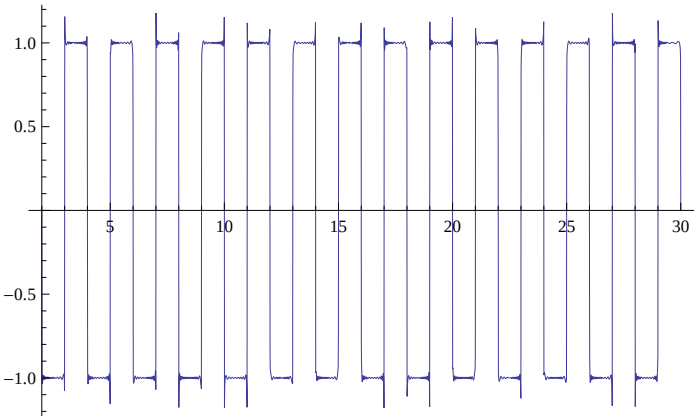

```
DiscretePlot[{E2[2, n, 1] - E2[2, n - 1, 1]}, {n, 2, 100}]
```



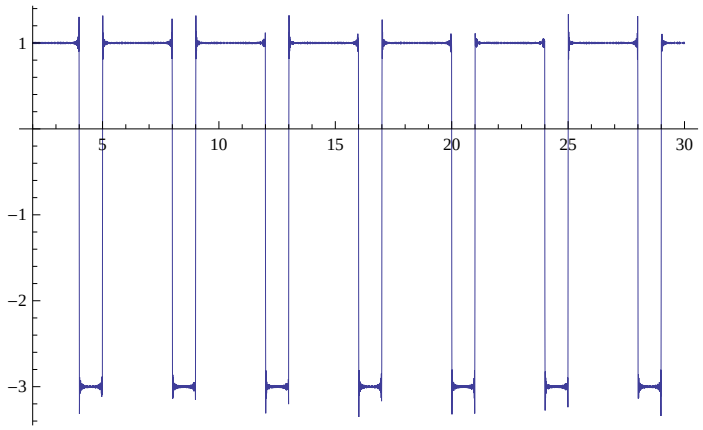

```
N[md2[100, 6]]
```

```
0.997257
```

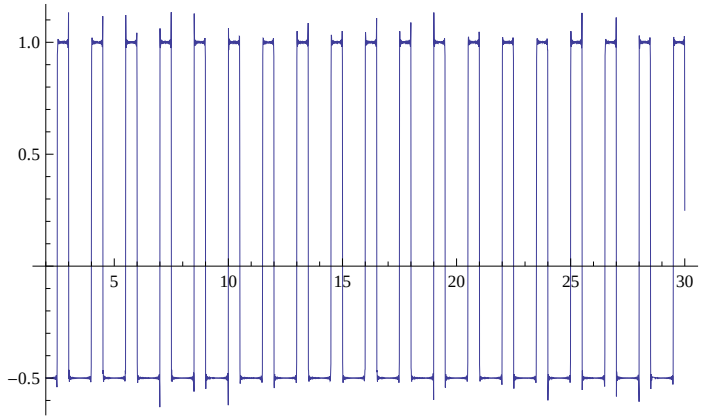
```
Plot[ md2[n, 2], {n, 2, 30}]
```



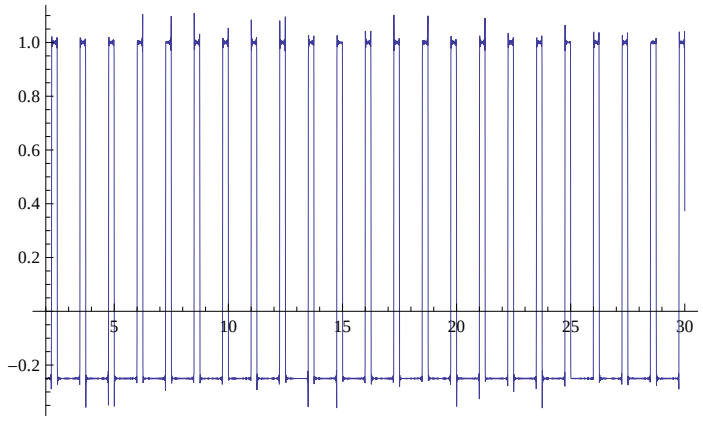
```
Plot[ md2[n, 4], {n, 2, 30}]
```



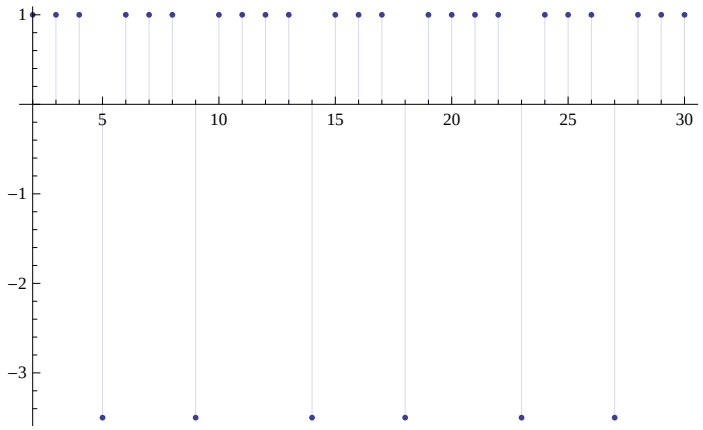

```
Plot[ md2[n, 3 / 2], {n, 2, 30}]
```



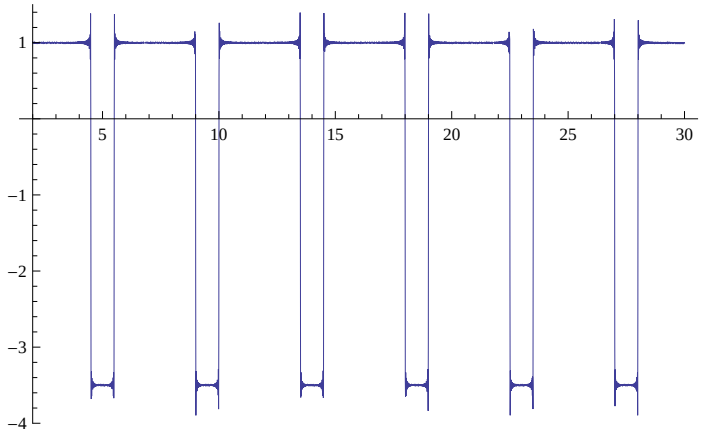

```
Plot[ md2[n, 5 / 4], {n, 2, 30}]
```



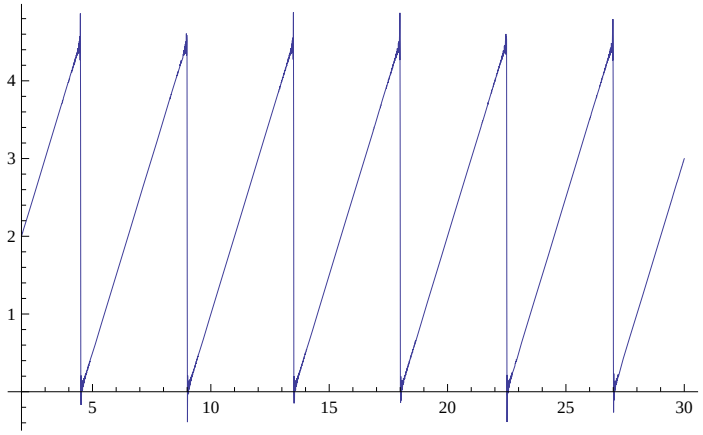
```
DiscretePlot[{E2[9 / 2, n, 1] - E2[9 / 2, n - 1, 1]}, {n, 2, 30}]
```



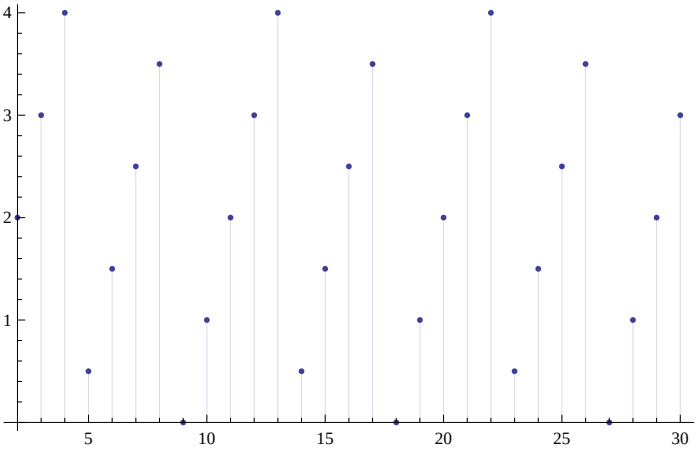

```
Plot[ md2[n, 9 / 2], {n, 2, 30}]
```



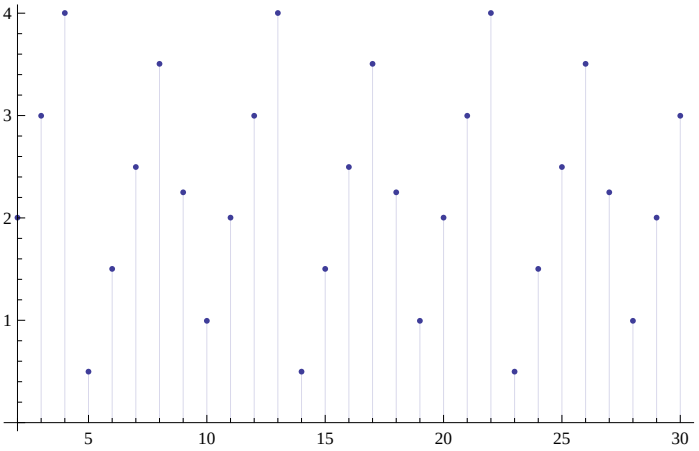

```
Plot[ md[n, 9 / 2], {n, 2, 30}]
```



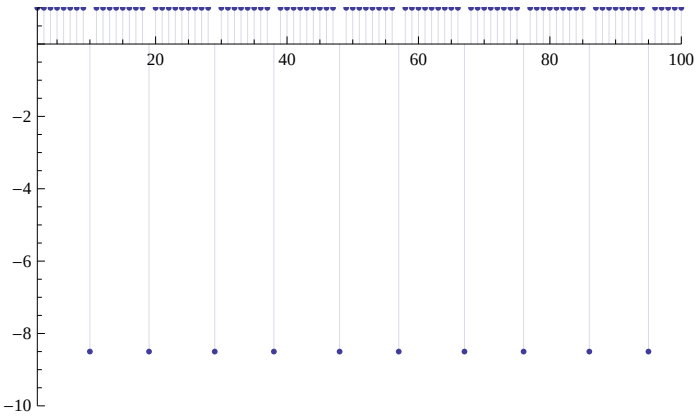
```
DiscretePlot[Mod[n, 9 / 2], {n, 2, 30}]
```



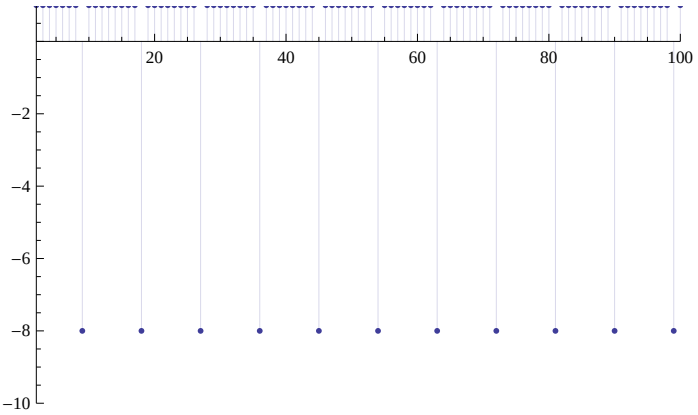

```
DiscretePlot[ md[n, 9 / 2], {n, 2, 30}]
```



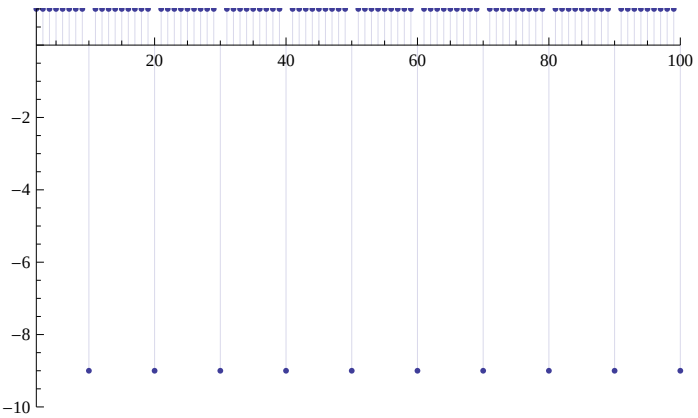

```
DiscretePlot[ST[9.5, n], {n, 2, 100}, PlotRange → {{2, 100}, {-10, 1}}]
```



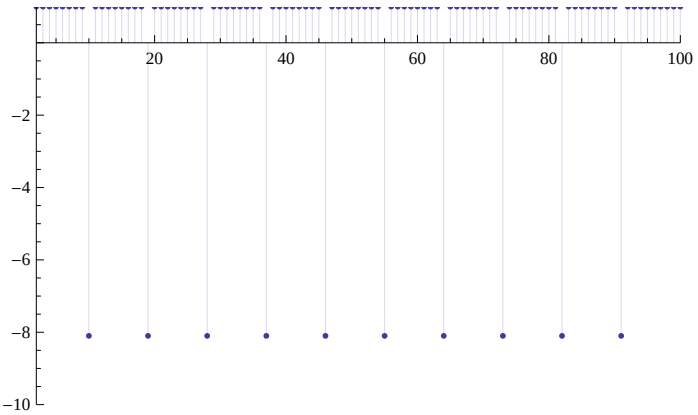
```
DiscretePlot[ST[9, n], {n, 2, 100}, PlotRange → {{2, 100}, {-10, 1}}]
```



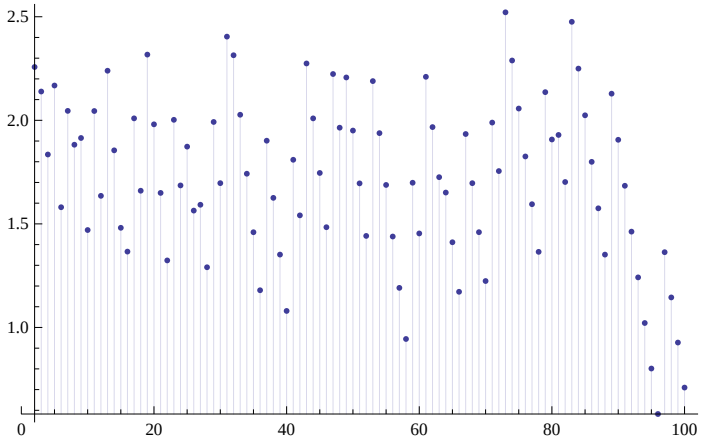

```
DiscretePlot[ST[10, n], {n, 2, 100}, PlotRange → {{2, 100}, {-10, 1}}]
```




```
DiscretePlot[ST[9.1, n], {n, 2, 100}, PlotRange → {{2, 100}, {-10, 1}}]
```



```
DiscretePlot[P2[2, n] + LAdd[2, n] - LAdd[1.00001, n] + LAdd[1.000001, 1.4513692], {n, 2, 100}]
```




```
LogIntegral[1.000001]
```

```
-13.2383
```

```
LAdd[1.000001, 80] - LAdd[1.000001, 1.4513692]
```

$25.6786 - 2.49006 \times 10^{-10}\ i$

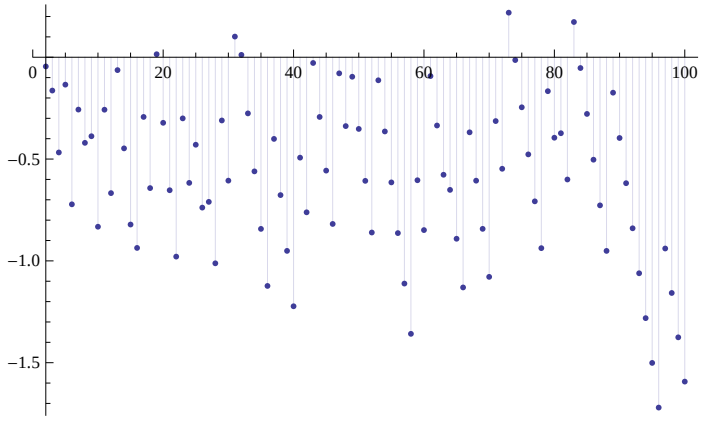
```
N[LogIntegral[80]]
```

```
25.6786
```

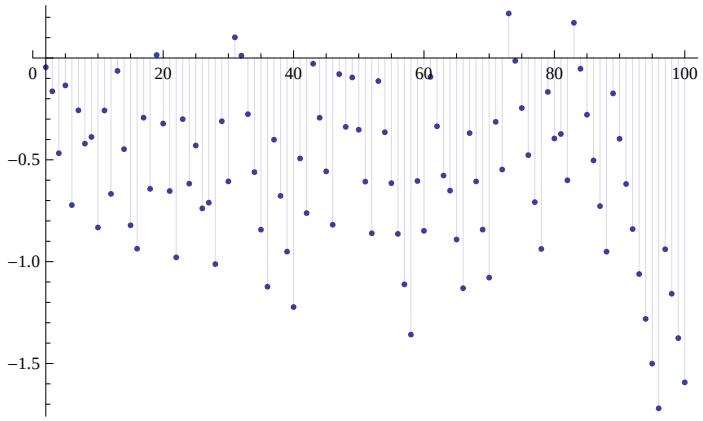
```
LAdd[1.000001, 1.4513692]
```

```
13.8155
```

```
DiscretePlot[P2[2, n] + LAdd[2, n] - LogIntegral[n], {n, 2, 100}]
```



```
DiscretePlot[P2[2, n] + LAdd[2, n] - LAdd[1.00001, n] + LAdd[1.00001, 1.4513692], {n, 2, 100}]
```




```
s1[n_] := Sum[Co[k], {k, 1, n}]
s2[n_] := Sum[ST[5 / 2, k], {k, 1, n}]
```

```
s1[100]
```

```
0
```

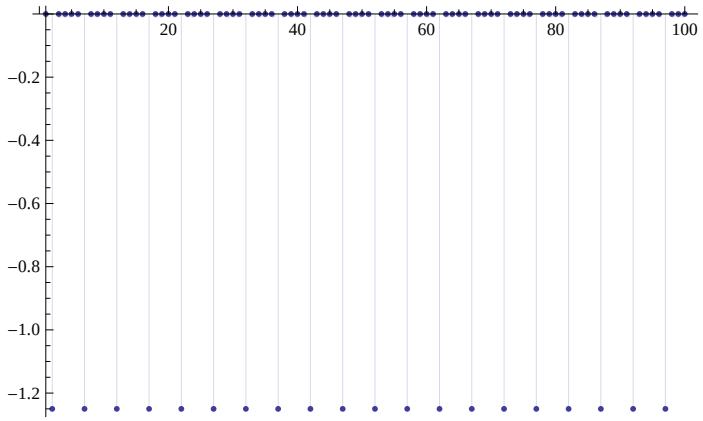
```
s2[100]
```

```
0
```

```
Co[2]
```

$$-\frac{1}{4}$$

```
DiscretePlot[{s1[n] - s2[n]}, {n, 1, 100}]
```




```
DiscretePlot[{s2[n]}, {n, 1, 100}]
```

```
s1[1]
```

```
1
```

```
Table[{n, s1[n], s2[n]}, {n, 1, 40}] // TableForm
```

1	1	1
2	$\frac{3}{4}$	2
3	$\frac{1}{2}$	$\frac{1}{2}$
4	$\frac{3}{2}$	$\frac{3}{2}$
5	0	0
6	1	1
7	$\frac{3}{4}$	2
8	$\frac{1}{2}$	$\frac{1}{2}$
9	$\frac{3}{2}$	$\frac{3}{2}$
10	0	0
11	1	1
12	$\frac{3}{4}$	2
13	$\frac{1}{2}$	$\frac{1}{2}$
14	$\frac{3}{2}$	$\frac{3}{2}$
15	0	0
16	1	1
17	$\frac{3}{4}$	2
18	$\frac{1}{2}$	$\frac{1}{2}$
19	$\frac{3}{2}$	$\frac{3}{2}$
20	0	0
21	1	1
22	$\frac{3}{4}$	2
23	$\frac{1}{2}$	$\frac{1}{2}$
24	$\frac{3}{2}$	$\frac{3}{2}$
25	0	0
26	1	1
27	$\frac{3}{4}$	2
28	$\frac{1}{2}$	$\frac{1}{2}$
29	$\frac{3}{2}$	$\frac{3}{2}$
30	0	0
31	1	1
32	$\frac{3}{4}$	2
33	$\frac{1}{2}$	$\frac{1}{2}$
34	$\frac{3}{2}$	$\frac{3}{2}$
35	0	0
36	1	1
37	$\frac{3}{4}$	2
38	$\frac{1}{2}$	$\frac{1}{2}$
39	$\frac{3}{2}$	$\frac{3}{2}$
40	0	0

```
ST[5 / 2, 1]
```

```
1
```

S

ST[5 / 2, 2]

1

ST[5 / 2, 3]

$$-\frac{3}{2}$$

ST[5 / 2, 4]

1

ST[5 / 2, 5]

$$-\frac{3}{2}$$