```
D[n^x, x]
```

$n^x \text{Log}[n]$

```
Integrate[ n^x Log[n], {x, 0, s}]
```

$-1 + n^s$

```
D[n^x, n]
```

$n^{-1+x} x$

```
D[n^-x, x]
```

$-n^{-x} \text{Log}[n]$

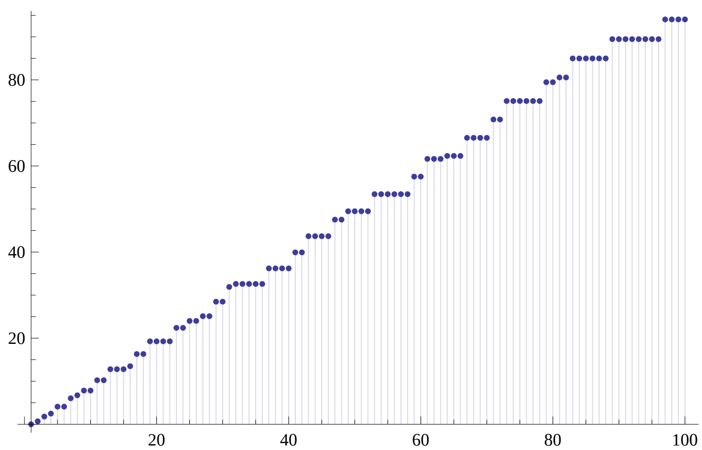
```
D[ (1^-s + 2^-s + 3^-s + 4^-s)^k, s]
```

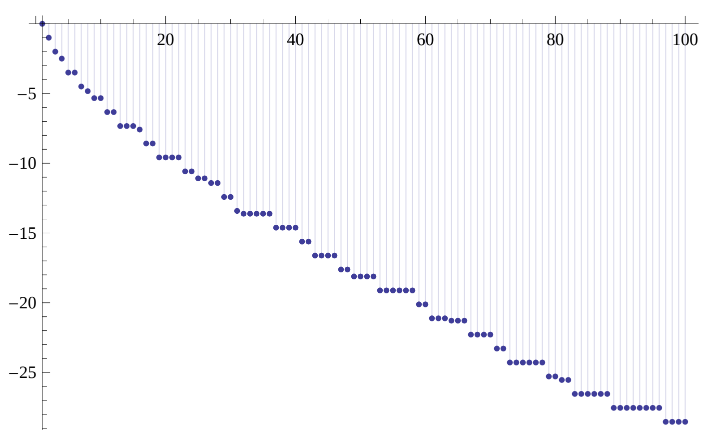
$(1 + 2^{-s} + 3^{-s} + 4^{-s})^{-1+k} k (-2^{-s} \text{Log}[2] - 3^{-s} \text{Log}[3] - 4^{-s} \text{Log}[4])$

```
Limit[(1 + 2^-s + 3^-s + 4^-s)^k Log[1 + 2^-s + 3^-s + 4^-s], k → t]
```

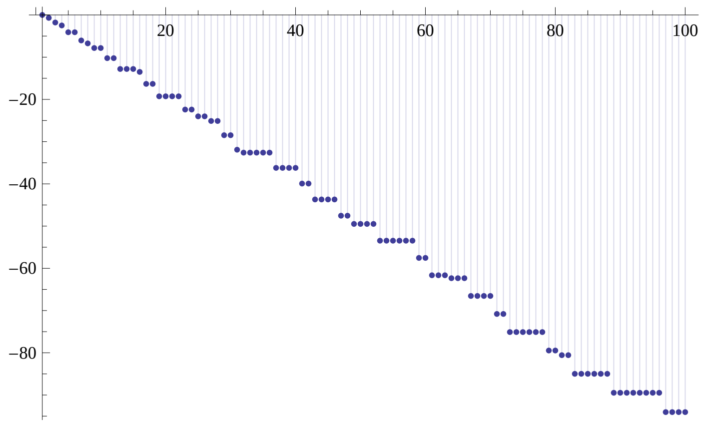
$(1 + 2^{-s} + 3^{-s} + 4^{-s})^t \text{Log}[1 + 2^{-s} + 3^{-s} + 4^{-s}]$

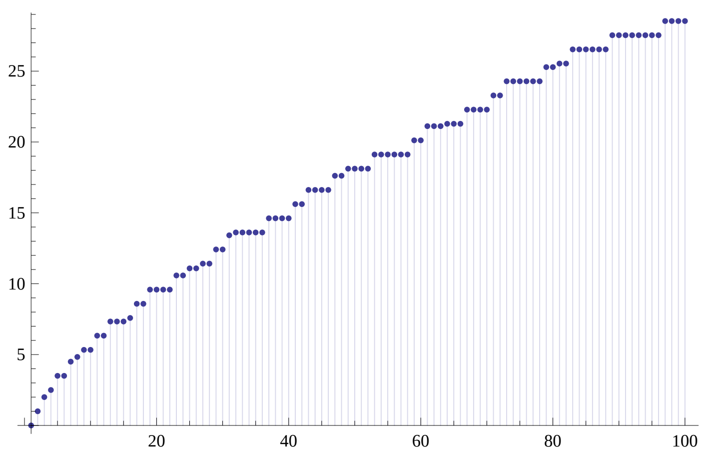
```
ff[n_] := MoebiusMu[n]
G2[n_, k_, s_] := Sum[ j^-s ff[j] G2[Floor[n / j], k - 1, s], {j, 2, n}]; G2[n_, 0, s_] := 1
G1[n_, z_, s_] := Sum[ Binomial[z, k] G2[n, k, s], {k, 0, Log[2, n]}]
DiscretePlot[Limit[D[G1[n, z, s] / z, s] /. s → 0, z → 0], {n, 1, 100}]
DiscretePlot[Limit[D[G1[n, z, 0], z], z → 0], {n, 1, 100}]
```



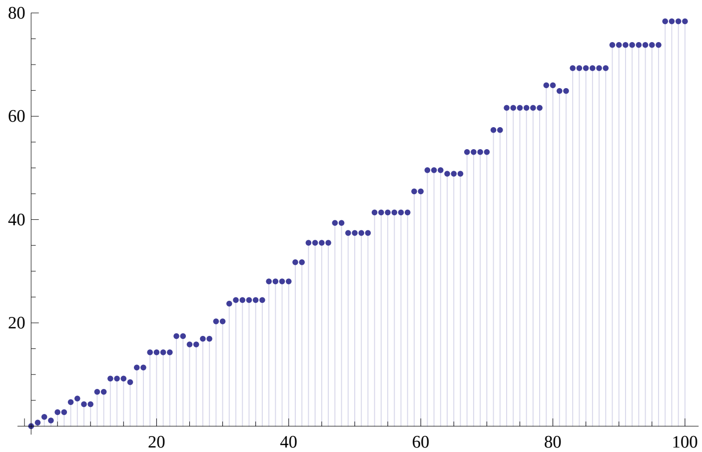


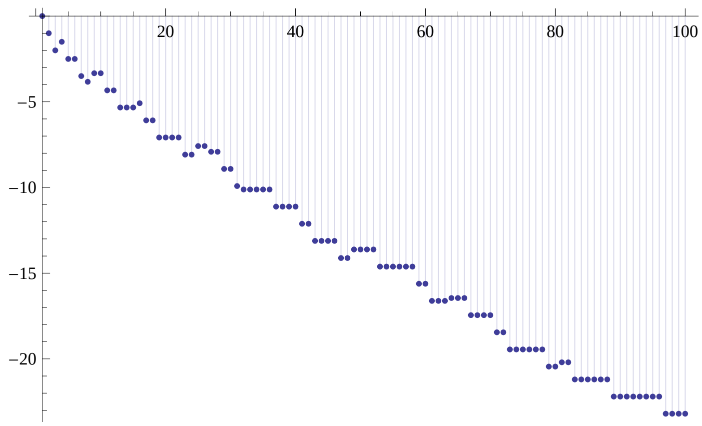
```
ff[n_] := 1
G2[n_, k_, s_] := Sum[ j^-s ff[j] G2[Floor[n / j], k - 1, s], {j, 2, n}]; G2[n_, 0, s_] := 1
G1[n_, z_, s_] := Sum[ Binomial[z, k] G2[n, k, s], {k, 0, Log[2, n]}]
DiscretePlot[Limit[D[G1[n, z, s] / z, s] /. s → 0, z → 0], {n, 1, 100}]
DiscretePlot[Limit[D[G1[n, z, 0], z], z → 0], {n, 1, 100}]
```



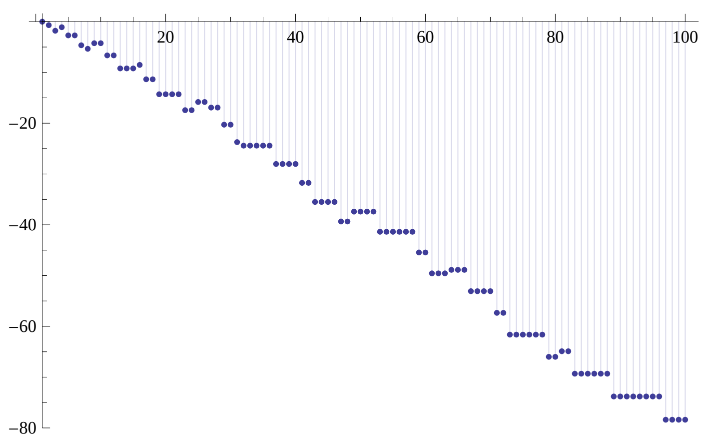


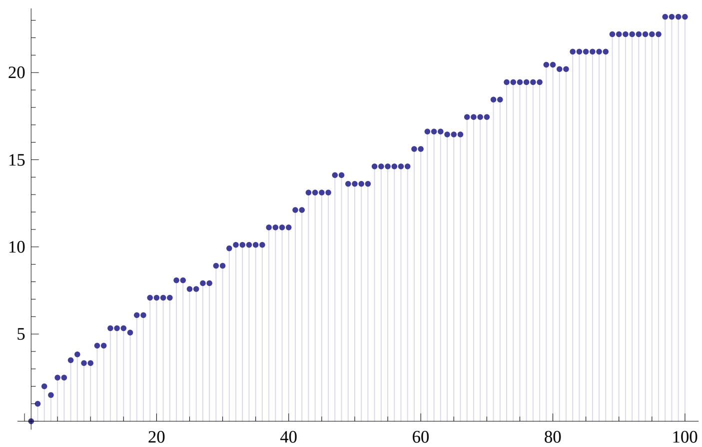

```
ff[n_] := LiouvilleLambda[n]
G2[n_, k_, s_] := Sum[ j^-s ff[j] G2[Floor[n / j], k - 1, s], {j, 2, n}]; G2[n_, 0, s_] := 1
G1[n_, z_, s_] := Sum[ Binomial[z, k] G2[n, k, s], {k, 0, Log[2, n]}]
DiscretePlot[Limit[D[G1[n, z, s] / z, s] /. s → 0, z → 0], {n, 1, 100}]
DiscretePlot[Limit[D[G1[n, z, 0], z], z → 0], {n, 1, 100}]
```






```
ff[n_] := Abs[MoebiusMu[n]]
G2[n_, k_, s_] := Sum[ j^-s ff[j] G2[Floor[n / j], k - 1, s], {j, 2, n}]; G2[n_, 0, s_] := 1
G1[n_, z_, s_] := Sum[ Binomial[z, k] G2[n, k, s], {k, 0, Log[2, n]}]
DiscretePlot[Limit[D[G1[n, z, s] / z, s] /. s → 0, z → 0], {n, 1, 100}]
DiscretePlot[Limit[D[G1[n, z, 0], z], z → 0], {n, 1, 100}]
```





20
15
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40
60
80
100