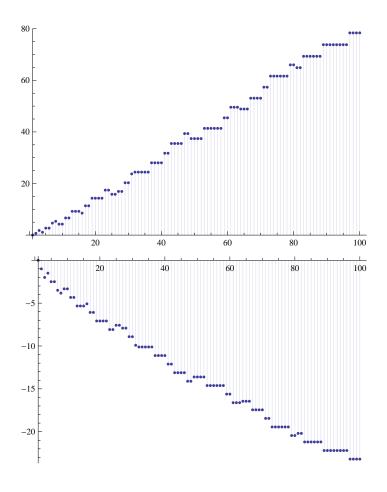
```
D[n^x, x]
nx Log[n]
Integrate[n^x Log[n], {x, 0, s}]
 -1 + n^s
D[n^x, n]
n^{-1+x} x
D[n^{-x}, x]
-n^{-x} Log[n]
D[(1^-s+2^-s+3^-s+4^-s)^k, s]
  (1 + 2^{-s} + 3^{-s} + 4^{-s})^{-1+k} \; k \; (-2^{-s} \; \text{Log} \, [\, 2\, ] \; -3^{-s} \; \text{Log} \, [\, 3\, ] \; -4^{-s} \; \text{Log} \, [\, 4\, ] \, )
Limit [(1 + 2^{-s} + 3^{-s} + 4^{-s})^k \text{Log}[1 + 2^{-s} + 3^{-s} + 4^{-s}], k \to t]
  (1 + 2^{-s} + 3^{-s} + 4^{-s})^{t} \text{Log}[1 + 2^{-s} + 3^{-s} + 4^{-s}]
ff[n_] := MoebiusMu[n]
         \texttt{G2}[\texttt{n}\_\texttt{, k}\_\texttt{, s}\_\texttt{]} := \\          \texttt{Sum}[\texttt{j}^-\texttt{sff}[\texttt{j}] \\          \texttt{G2}[\texttt{Floor}[\texttt{n}/\texttt{j}], \texttt{k}-\texttt{1}, \texttt{s}], \\          \texttt{\{j, 2, n\}]}; \\          \texttt{G2}[\texttt{n}\_\texttt{, 0, s}\_\texttt{]} := \\          \texttt{1} := \\          \texttt{2} := \\          \texttt{1} := \\          \texttt{2} := \\          \texttt{2} := \\          \texttt{3} := \\          \texttt{4} := \\     \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\     \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\     \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\         \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\         \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\         \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\     \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\     \texttt{4} := \\          \texttt{4} := \\          \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\         \texttt{4} := \\    
G1[n_{z}, z_{s}] := Sum[Binomial[z, k] G2[n, k, s], \{k, 0, Log[2, n]\}]
\label{eq:definit} D[G1[n,z,s] \ / \ z,s] \ / \ . \ s \rightarrow 0 \ , \ z \rightarrow 0] \ , \ \{n,1,100\}]
\texttt{DiscretePlot[Limit[D[G1[n, z, 0], z], z} \rightarrow \texttt{0], \{n, 1, 100\}]}
80
 60
20
                                                                                                                                                                                                                                                                                                                   100
                                                                                                                                 40
                                                                                                                                                                                             60
                                                                                                                                                                                                                                                                                                                   100
  -10
 -15
 -20
  -25
```

```
ff[n_] := 1
 \texttt{G2}[\texttt{n\_, k\_, s\_}] := \texttt{Sum}[\texttt{j^-sff}[\texttt{j}] \texttt{G2}[\texttt{Floor}[\texttt{n/j}], \texttt{k-1, s}], \texttt{\{j, 2, n\}}]; \texttt{G2}[\texttt{n\_, 0, s\_}] := \texttt{1} 
G1[n_{z}, z_{s}] := Sum[Binomial[z, k] G2[n, k, s], \{k, 0, Log[2, n]\}]
\label{eq:definit} D[G1[n,z,s] \ / \ z,s] \ / \ . \ s \rightarrow 0 \ , \ z \rightarrow 0] \ , \ \{n,1,100\}]
\label{eq:discretePlot} \texttt{DiscretePlot}[\texttt{Limit}[\texttt{D}[\texttt{G1}[\texttt{n},\,\texttt{z},\,\texttt{0}]\,,\,\texttt{z}]\,,\,\texttt{z}\to\texttt{0}]\,,\,\{\texttt{n},\,\texttt{1},\,\texttt{100}\}]
-20
-40
-60
-80
25
20
15
```

$$\begin{split} & \text{ff}[n_{-}] := \text{LiouvilleLambda}[n] \\ & \text{G2}[n_{-}, k_{-}, s_{-}] := \text{Sum}[j^{-}\text{sff}[j] \text{G2}[\text{Floor}[n/j], k-1, s], \{j, 2, n\}]; \text{G2}[n_{-}, 0, s_{-}] := 1 \\ & \text{G1}[n_{-}, z_{-}, s_{-}] := \text{Sum}[\text{Binomial}[z, k] \text{G2}[n, k, s], \{k, 0, \text{Log}[2, n]\}] \\ & \text{DiscretePlot}[\text{Limit}[D[\text{G1}[n, z, s]/z, s]/. s \rightarrow 0, z \rightarrow 0], \{n, 1, 100\}] \\ & \text{DiscretePlot}[\text{Limit}[D[\text{G1}[n, z, 0], z], z \rightarrow 0], \{n, 1, 100\}] \\ \end{aligned}$$



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

