```
Dk[n_, k_, s_] := Sum[j^-s Dk[n / j, k - 1, s], {j, 1, n}]; Dk[n_, 0, s_] := UnitStep[n - 1]
Table[Dk[n, k, 0], {n, 1, 50}, {k, 1, 7}] // TableForm
```

1	1	1	1	1	1	1
2	3	4	5	6	7	8
3	5	7	9	11	13	15
4	8	13	19	26	34	43
5	10	16	23	31	40	50
6	14	25	39	56	76	99
7	16	28	43	61	82	106
8	20	38	63	96	138	190
9	23	44	73	111	159	218
10	27	53	89	136	195	267
11	29	56	93	141	201	274
12	35	74	133	216	327	470
13	37	77	137	221	333	477
14	41	86	153	246	369	526
15	45	95	169	271	405	575
16	50	110	204	341	531	785
17	52	113	208	346	537	792
18	58	131	248	421	663	988
19	60	134	252	426	669	995
20	66	152	292	501	795	1191
21	70	161	308	526	831	1240
22	74	170	324	551	867	1289
23	76	173	328	556	873	1296
24	84	203	408	731	1209	1884
25	87	209	418	746	1230	1912
26	91	218	434	771	1266	1961
27	95	228	454	806	1322	2045
28	101	246	494	881	1448	2241
29	103	249	498	886	1454	2248
30	111	276	562	1011	1670	2591
31	113	279	566	1016	1676	2598
32	119	300	622	1142	1928	3060
33	123	309	638	1167	1964	3109
34	127	318	654	1192	2000	3158
35	131	327	670	1217	2036	3207
36	140	363	770	1442	2477	3991
37	142	366	774	1447	2483	3998
38	146	375	790	1472	2519	4047
39	150	384	806	1497	2555	4096
40	158	414	886	1672	2891	4684
41	160	417	890	1677	2897	4691
42	168	444	954	1802	3113	5034
43	170	447	958	1807	3119	5041
44	176	465	998	1882	3245	5237
45	182	483	1038	1957	3371	5433
46	186	492	1054	1982	3407	5482
47	188	495	1058	1987	3413	5489
48	198	540	1198	2337	4169	6959
49	201	546	1208	2352	4190	6987
50	207	564	1248	2427	4316	7183

```
Dk[n_, k_, s_] := Dk[n, k, s] = Sum[j^-s Dk[Floor[n / j], k - 1, s], {j, 1, n}];
Dk[n_, 0, s_] := UnitStep[n - 1]
Grid[Table[ Chop[ Dk[30 000, k, s] - N[Zeta[s]^k]], {k, 1, 3}, {s, 2, 4, .5}]]
```

-0.0000333328	-1.28297×10^{-7}	-5.55533×10^{-10}	0	0
-0.00041542	-1.55614×10^{-6}	-6.64545×10^{-9}	0	0
-0.00284113	-0.0000103484	-4.35834×10^{-8}	-1.98172×10^{-10}	0

```
Dk1[n_, s_] := Sum[j^-s, {j, 1, n}]
Dk2[n_, s_] := Sum[j^-s k^-s, {j, 1, n}, {k, 1, n / j}]
Dk3[n_, s_] := Sum[j^-s k^-s m^-s, {j, 1, n}, {k, 1, n / j}, {m, 1, n / (j k)}]
Dk[n_, k_, s_] := Sum[j^-s Dk[n / j, k - 1, s], {j, 1, n}]; Dk[n_, 0, s_] := UnitStep[n - 1]
FullSimplify[
 Table[{Dk1[n, s] - Dk[n, 1, s], Dk2[n, s] - Dk[n, 2, s], Dk3[n, s] - Dk[n, 3, s]}, {n, 1, 50}] //
  TableForm]
```

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
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0	0	0
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0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

Dk2[5, s]

$5 + 2^{1-s} + 3^{-s} + 4^{-s} + 5^{-s}$

```
Dk[5, 2, s]
```

$1 + 2^{1-2s} + 2^{-s} + 2 \times 3^{-s} + 2 \times 5^{-s} + 2^{-s}(1 + 2^{-s})$

```
dk[n_, k_, s_] := Sum[dk[j, 1, s] dk[n / j, k - 1, s], {j, Divisors[n]}];
dk[n_, 1, s_] := n^-s ; dk[n_, 0, s_] := 0; dk[1, 0, s_] := 1
Dk[n_, k_, s_] := Sum[j^-s Dk[n / j, k - 1, s], {j, 1, n}]; Dk[n_, 0, s_] := UnitStep[n - 1]
FullSimplify[Grid[Table[dk[n, k, s] - (Dk[n, k, s] - Dk[n - 1, k, s]), {n, 1, 50, 5}, {k, 1, 5}]]]
```

```
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
```

```
Dmy[n_, k_, s_, y_] := Sum[ (j + y) ^-s Dmy[n (j + y) ^-1, k - 1, s, y], {j, 1, n - y}];
Dmy[n_, 0, s_, y_] := UnitStep[n - 1]
Grid[Table[Chop[Dmy[30 000, k, s, y] - N[Zeta[s, y + 1] ^k]], {k, 1, 3}, {s, 2, 4}, {y, 1, 4}]]
```

{-0.0000333328, -0.0000333328, -0.0000333328, -0.0000333328}	$\{-5.55537 \times 10^{-10}, -5.55537 \times 10^{-10}, -5.55537 \times 10^{-10}, -5.55537 \times 10^{-10}\}$	{0, 0, 0, 0}
{-0.000348755, -0.000315423, -0.000293201, -0.000276536}	$\{-5.53439 \times 10^{-9}, -4.97887 \times 10^{-9}, -4.60854 \times 10^{-9}, -4.3308 \times 10^{-9}\}$	{0, 0, 0, 0}
{-0.00169487, -0.00123141, -0.000963755, -0.000784785}	$\{-2.53136 \times 10^{-8}, -1.8007 \times 10^{-8}, -1.38248 \times 10^{-8}, -1.1051 \times 10^{-8}\}$	{0, 0, 0, 0}

```
Dmy[1000, 1, 2, 1]
```

999

```
Limit[ (n^z - n^0) z^-1, z → 0]
```

Log[n]

```
Limit[ (n z^-1 + n^0) ^z, z → Infinity]
```

e^n

```
Limit[ (n z + n^0) ^ (z^-1), z → 0]
```

e^n

```
dz[n_, z_] := dz[n, z] = Product[(-1) ^p[[2]] Binomial[-z, p[[2]]], {p, FI[n]}];
FI[n_] := FactorInteger[n]; FI[1] := {}
Dz[n_, z_] := Dz[n, z] = Sum[dz[j, z], {j, 1, n}]
bin[z_, k_] := Product[z - j, {j, 0, k - 1}] / k !
dd[ n_, k_, x_] := dd[n, k, x] = x Sum[ dd[ n (j x) ^-1, k - 1, x], {j, 1, n x^-1}];
dd[n_, 0, x_] := UnitStep[n - 1]
dda[n_, k_, x_] := x^k Dz[ Floor[n / (x^k)], k]
bd[n_, z_, x_] := Sum[ bin[z, k] dd[n, k, x], {k, 0, Log[x, n]}]
bda[n_, z_, x_] := Sum[ bin[z, k] If[ bin[z, k] == 0, 0, dda[n, k, x]], {k, 0, Log[x, n]}]
DiscretePlot[Expand[D[bda[n, z, 1.05], z]] /. z → 0, {n, 2, 20}]
```

```
dd[1527, 4, 4.3]
```

6495.72

```
dda[1527, 4, 4.3]
```

6495.72

```
DiscretePlot[bda[n, -1, 1.1], {n, 2, 100}]
```

```
dd[1, 1, 1.00000001]
```

0.

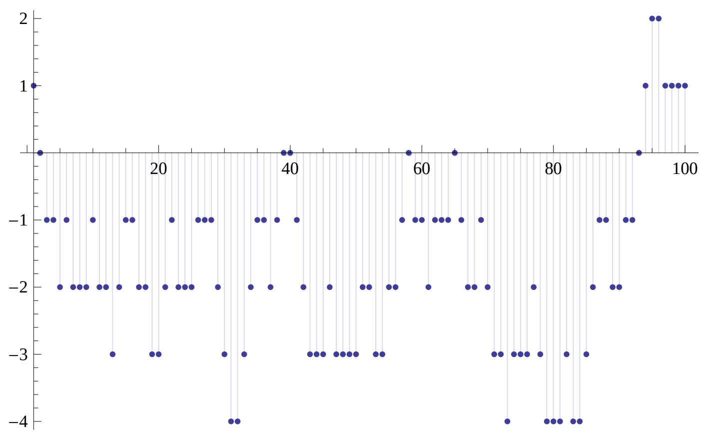
```
bda[100, 1, 1.01]
```

100.99

```
D2[n_, k_] := D2[n, k] = Sum[ D2[Floor[n / j], k - 1], {j, 2, n}]; D2[n_, 0] := UnitStep[n - 1]
```

```
D2a[n_, z_] := Sum[ Binomial[ z, k] D2[n, k], {k, 0, Log[2, n]}]
D2b[n_, z_] := Sum[(-1)^k Binomial[ z, k] D2[n, k], {k, 0, Log[2, n]}]
```

```
DiscretePlot[ D2a[n, -1], {n, 1, 100}]
```




```
D2a[1, 2]
```

1

```
E2a[n_, k_, x_, s_] := E2a[n, k, x, s] = Sum[ j^(-s) E2a[n / j, k - 1, x, s], {j, 2, n}] -
   x Sum[ (j x)^(-s) E2a[n / (x j), k - 1, x, s], {j, 1, n / x}];
E2a[n_, 0, a_, s_] := UnitStep[n - 1]
E2ab[n_, k_, x_, s_] := E2ab[n, k, x, s] =
  Sum[ (j + 1)^(-s) E2ab[n / (j + 1), k - 1, x, s] - x (j x)^(-s) E2ab[n / (x j), k - 1, x, s],
   {j, 1, n - 1}]; E2ab[n_, 0, a_, s_] := UnitStep[n - 1]
E1a[n_, k_, x_, s_] := E1a[n, k, x, s] = Sum[j^(-s) E1a[n / j, k - 1, x, s], {j, 1, n}] -
   x Sum[(j x)^(-s) E1a[n / (x j), k - 1, x, s], {j, 1, n / x}];
E1a[n_, 0, a_, s_] := UnitStep[n - 1]
E1ab[n_, k_, x_, s_] := E1ab[n, k, x, s] =
  Sum[j^(-s) E1ab[n / j, k - 1, x, s] - x (j x)^(-s) E1ab[n / (x j), k - 1, x, s], {j, 1, n}];
E1ab[n_, 0, a_, s_] := UnitStep[n - 1]
```

```
E1a[1, 1, 2, 0]
```

1

```
E2a[1, 1, 2, 0]
```

0

```
Series[ E^{x + 1}^2, {x, 0, 10}]
```

$$\left\{e + 2 e x + 3 e x^2 + \frac{10 e x^3}{3} + \frac{19 e x^4}{6} + \frac{13 e x^5}{5} + \frac{173 e x^6}{90} + \frac{407 e x^7}{315} + \frac{45 e x^8}{56} + \frac{5281 e x^9}{11340} + \frac{28787 e x^{10}}{113400} + O[x]^{11}\right\}$$

```
D2[n_, k_] := D2[n, k] = Sum[ D2[Floor[n / j], k - 1], {j, 2, n}]; D2[n_, 0] := UnitStep[n - 1]
dz[n_, z_] := dz[n, z] = Product[(-1)^p[[2]] Binomial[-z, p[[2]]], {p, FI[n]}];
FI[n_] := FactorInteger[n]; FI[1] := {}
Dz[n_, z_] := Dz[n, z] = Sum[dz[j, z], {j, 1, n}]
F[n_, z_, t_] := Sum[ z^k / k! Dz[n, k], {k, 0, t}]
F2[n_, z_] := Sum[ E^z z^k / k! D2[n, k], {k, 0, Log[2, n]}]; F2[n_, 0] := UnitStep[n - 1]
F3[n_, z_] := Sum[ z^k / k! D2[n, k], {k, 0, Log[2, n]}]; F3[n_, 0] := UnitStep[n - 1]
F33[n_, k_] := Sum[ (-1)^(k - j) Binomial[k, j] F3[n, j], {j, 0, k}]
DF[n_] := Sum[ (-1)^(k + 1) / k F33[n, k], {k, 1, Log[2, n]}]
F33[n_, 0] := UnitStep[n - 1]
```

```
N[F[100, -1, 30]]
```

-1.1951

```
N[F2[100, 1]]
```

825.274

```
N[E^2 F3[100, 2]]
```

9856.18

```
F33[100, 7]
```

0

```
F2[100, 2]
```

$$\frac{12005 e^2}{9}$$

```
DF[100]
```

99

```
Limit[ (n x^-1 + x^0)^x, x → Infinity]
```

e^n

```
L2[n_, 1, b_] := L2[n, 1, b] = Sum[Log[j], {j, 2, n}] - b Sum[Log[j b], {j, 1, n / b}]
L2[n_, k_, b_] := Sum[L2[n / j, k - 1, b], {j, 2, n}] - b Sum[L2[n / (j b), k - 1, b], {j, 1, n}]
E2a[n_, k_, x_, s_] := E2a[n, k, x, s] = Sum[ j^(-s) E2a[n / j, k - 1, x, s], {j, 2, n}] -
   x Sum[ (j x)^(-s) E2a[n / (x j), k - 1, x, s], {j, 1, n / x}];
E2a[n_, 0, a_, s_] := UnitStep[n - 1]
```

```
{N[L2[20, 1, 2]], N[-D[E2a[20, 1, 2, s], s] /. s → 0]}
```

{-1.73615, -1.73615}

```
{N[L2[20, 2, 2]], N[-D[E2a[20, 2, 2, s], s] /. s → 0] / 2}
```

{-1.77601, -1.77601}

```
{N[L2[20, 3, 2]], N[-D[E2a[20, 3, 2, s], s] /. s → 0] / 3}
```

{-0.875469, -0.875469}

```
f[n_, k_, s_, x_] := Sum[ j^-s ( k^-1 - f[n j^-1, k + 1, s, x]), {j, 2, n}] -
  x Sum[ (j x)^-s ( k^-1 - f[n (j x)^-1, k + 1, s, x]), {j, 1, n / x}]
```

```
N[D[f[100, 1, s, 2], s] /. s → 0]
```

-6.70877

```
D1y1[x_, s_, k_, y_] :=
 D1y1[x, s, k - 1, y] + y Sum[(1 + j y)^-s D1y1[x (1 + j y)^-1, s, k - 1, y], {j, 1, (x - 1) / y}];
D1y1[x_, s_, 0, y_] := UnitStep[x - 1]
D1y[x_, s_, k_, y_] := y Sum[(1 + j y)^-s D1y[x (1 + j y)^-1, s, k - 1, y], {j, 1, (x - 1) / y}];
D1y[x_, s_, 0, y_] := UnitStep[x - 1]
```

```
FullSimplify[y^(z (1 - s)) Sum[ (j + y^-1)^-(z s), {j, 1, Infinity}] /. {y → 2, z → 2, s → 2}]
```

$-4 + \frac{\pi^4}{24}$

```
Expand[(y^(1 - s) Zeta[s, 1 + y^-1])^z /. {y → 2, z → 2, s → 2}]
```

$4 - \pi^2 + \frac{\pi^4}{16}$

```
Expand[(y^(z (1 - s)) Zeta[s, 1 + y^-1]^z) /. {y → 2, z → 2, s → 2}]
```

$4 - \pi^2 + \frac{\pi^4}{16}$

```
Expand[
 (y^(z (1 - s)) (Sum[ 1 / (j + 1 + y^-1)^s, {j, 0, Infinity}])^z) /. {y → 2, z → 2, s → 2}]
```

$4 - \pi^2 + \frac{\pi^4}{16}$

```
Expand[(y^(z (1 - s)) (Sum[(j + y^-1)^-s, {j, 1, Infinity}])^z) /. {y → 2, z → 2, s → 2}]
```

$4 - \pi^2 + \frac{\pi^4}{16}$

```
(j + y^-1) ^-s (j + y^-1) ^-s
```

$$\left(j+\frac{1}{y}\right)^{-2s}$$

```
Expand[((1 + y^-1) ^-s + (2 + y^-1) ^-s + (3 + y^-1) ^-s + (4 + y^-1) ^-s + (5 + y^-1) ^-s) ^2]
```

$$\left(1+\frac{1}{y}\right)^{-2s}+\left(2+\frac{1}{y}\right)^{-2s}+2\left(1+\frac{1}{y}\right)^{-s}\left(2+\frac{1}{y}\right)^{-s}+\left(3+\frac{1}{y}\right)^{-2s}+2\left(1+\frac{1}{y}\right)^{-s}\left(3+\frac{1}{y}\right)^{-s}+2\left(2+\frac{1}{y}\right)^{-s}\left(3+\frac{1}{y}\right)^{-s}+\left(4+\frac{1}{y}\right)^{-2s}+2\left(1+\frac{1}{y}\right)^{-s}\left(4+\frac{1}{y}\right)^{-s}+2\left(2+\frac{1}{y}\right)^{-s}\left(4+\frac{1}{y}\right)^{-s}+2\left(3+\frac{1}{y}\right)^{-s}\left(4+\frac{1}{y}\right)^{-s}+\left(5+\frac{1}{y}\right)^{-2s}+2\left(1+\frac{1}{y}\right)^{-s}\left(5+\frac{1}{y}\right)^{-s}+2\left(2+\frac{1}{y}\right)^{-s}\left(5+\frac{1}{y}\right)^{-s}+2\left(3+\frac{1}{y}\right)^{-s}\left(5+\frac{1}{y}\right)^{-s}+2\left(4+\frac{1}{y}\right)^{-s}\left(5+\frac{1}{y}\right)^{-s}$$

```
D[ Sum[ (j + y^-1) ^-s, {j, 1, 10}] ^2, y]
```

$$2\left(\left(1+\frac{1}{y}\right)^{-s}+\left(2+\frac{1}{y}\right)^{-s}+\left(3+\frac{1}{y}\right)^{-s}+\left(4+\frac{1}{y}\right)^{-s}+\left(5+\frac{1}{y}\right)^{-s}+\left(6+\frac{1}{y}\right)^{-s}+\left(7+\frac{1}{y}\right)^{-s}+\left(8+\frac{1}{y}\right)^{-s}+\left(9+\frac{1}{y}\right)^{-s}+\left(10+\frac{1}{y}\right)^{-s}\right)\left(\frac{s\left(1+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(2+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(3+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(4+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(5+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(6+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(7+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(8+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(9+\frac{1}{y}\right)^{-1-s}}{y^2}+\frac{s\left(10+\frac{1}{y}\right)^{-1-s}}{y^2}\right)$$

```
D[ y^(k (1 - s)) Sum[ (j + y^-1) ^-s, {j, 1, 10}] ^k, y] /. s → 0
```

$$10^k\, k\, y^{-1+k}$$

```
D1[n_, z_, k_, s_] :=
 D1[n, z, k, s] = 1 + ((z + 1) / k - 1) Sum[ j^-s D1[n / j, z, k + 1, s], {j, 2, n}]
Limit[ Limit[ D[D1[100, z, 1, s], z], z → 0], s → 0]
-Limit[ D[N[Limit[ D[D1[100, z, 1, s], z], z → 0]], s], s → 0]
```

$$\frac{428}{15}$$

94.0453

0

```
f1[n_, k_, s_] := Sum[ j^-s ( k^-1 - f1[n / j, k + 1, s]), {j, 2, n}]
```

```
N[Limit[D[f1[100, 1, s], s], s → 0]]
```

-94.0453

```
s1[n_, k_, y_, s_] := s1[n, k, y, s] =
  y Sum[ (j y + 1) ^-s ( k^-1 - s1[ n (j y + 1) ^-1, k + 1, y, s]), {j, 1, (n - 1) / y}]
```

```
-N[D[s1[100, 1, .5, s], s] /. s → 0]
```

95.6424

```
ml[ n_, k_] := Sum[ MoebiusMu[ d ] (Log[n / d]) ^k, {d, Divisors[n]}]
```

```
FullSimplify[ml[210, 4]]
```

24 Log[2] Log[3] Log[5] Log[7]

```
dz[n_, z_, s_] := n^-s Product[(-1)^p[[2]] Binomial[-z, p[[2]]], {p, FI[n]}];
FI[n_] := FactorInteger[n]; FI[1] := {}
```

```
D[Limit[D[dz[210, z, s], {s, 4}], s → 0], {z}]
```

$4\,z^3\,\text{Log}[210]^4$

```
D[dz[2 × 3, z, 0], {z, 2}] /. z → 0
```

2

```
dz[n_, z_, s_] :=
 dz[n, z, s] = If[n < 1, 0, n^-s Product[(-1)^p[[2]] Binomial[-z, p[[2]]], {p, FI[n]}]];
FI[n_] := FactorInteger[n]; FI[1] := {}
Dz[n_, z_, s_] := Dz[n, z, s] = Sum[dz[j, z, s], {j, 1, n}]
```

```
Sum[ dz[j, 1, -2] Dz[1000 j^-2, -1, -1], {j, 1, 1000^(1 / 2)}]
```

-1274

```
Sum[ dz[j, -1, -1] Dz[Floor[(1000 / j)^(1 / 2)], 1, -2], {j, 1, 1000}]
```

-1274

```
Sum[ LiouvilleLambda[j] j^1, {j, 1, 1000}]
```

-1274

```
Sum[ dz[j, 1, -1] Dz[Floor[(1000 / j)^(1 / 2)], -1, -2], {j, 1, 1000}]
```

303 076

```
Sum[MoebiusMu[j]^2 j^1, {j, 1, 1000}]
```

303 076

```
FullSimplify[2^s / 3^(2 s)]
```

$$\left(\frac{2}{9}\right)^s$$

```
Expand[Sum[ MoebiusMu[n] (n^-s) (m^(-2 s)), {n, 1, 6}, {m, 1, 6}]]
```

$$1 - 2^{-5 s} - 2^{-3 s} + 2^{-2 s} - 2^{-s} - 3^{-3 s} - 2^{-2 s}\,3^{-3 s} + 2^{-s}\,3^{-3 s} + 3^{-2 s} - 2^{-3 s}\,3^{-2 s} - 2^{-s}\,3^{-2 s} - 3^{-s} + 2^{-5 s}\,3^{-s} + 2^{-3 s}\,3^{-s} - 2^{-2 s}\,3^{-s} + 4^{-2 s} - 3^{-s}\,4^{-2 s} - 5^{-3 s} + 5^{-2 s} - 2^{-s}\,5^{-2 s} - 3^{-s}\,5^{-2 s} - 5^{-s} - 2^{-2 s}\,5^{-s} - 3^{-2 s}\,5^{-s} - 4^{-2 s}\,5^{-s} + 6^{-3 s} + 6^{-2 s} - 5^{-s}\,6^{-2 s} + 6^{-s} + 5^{-2 s}\,6^{-s}$$

```
Table[ {n, MoebiusMu[n]}, {n, 1, 20}]
```

{{1, 1}, {2, -1}, {3, -1}, {4, 0}, {5, -1}, {6, 1}, {7, -1}, {8, 0}, {9, 0}, {10, 1}, {11, -1},
 {12, 0}, {13, -1}, {14, 1}, {15, 1}, {16, 0}, {17, -1}, {18, 0}, {19, -1}, {20, 0}}

```
1 / 2^(2 s) (-1 / 2^s)
```

$-2^{-3 s}$

```
3^(2 s) × 2^s
```

$2^s 3^{2 s}$

```
tt[n_] := Sum[ If[ Floor[j^(1 / 2)] == j^(1 / 2), 1, 0] MoebiusMu[n / j], {j, Divisors[n]}]
Table[ Sum[ LiouvilleLambda[j], {j, Divisors[n]}], {n, 1, 30}]
```

{1, 0, 0, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0}

```
Table[tt[n] - LiouvilleLambda[n], {n, 1, 30}]
```

{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}

```
Sum[ Floor[(300 / j)^(1 / 2)] MoebiusMu[j], {j, 1, 300}]
```

-16

```
Sum[ LiouvilleLambda[ j ], {j, 1, 300}]
```

-16

```
Sum[ MoebiusMu[ n] x^n / (1 - x^n), {n, 1, Infinity}]
```

x

```
Sum[LiouvilleLambda[n] x^n / (1 - x^n), {n, 1, Infinity}]
```

$$\sum_{n=1}^{\infty} \frac{x^n \text{LiouvilleLambda}[n]}{1 - x^n}$$

```
Table[ {n, Sum[ dz[j^2, 2, 0], {j, Divisors[n]}], dz[n, 2, 0]^2}, {n, 1, 30}]
```

{{1, 1, 1}, {2, 4, 4}, {3, 4, 4}, {4, 9, 9}, {5, 4, 4}, {6, 16, 16},
{7, 4, 4}, {8, 16, 16}, {9, 9, 9}, {10, 16, 16}, {11, 4, 4}, {12, 36, 36},
{13, 4, 4}, {14, 16, 16}, {15, 16, 16}, {16, 25, 25}, {17, 4, 4}, {18, 36, 36},
{19, 4, 4}, {20, 36, 36}, {21, 16, 16}, {22, 16, 16}, {23, 4, 4}, {24, 64, 64},
{25, 9, 9}, {26, 16, 16}, {27, 16, 16}, {28, 36, 36}, {29, 4, 4}, {30, 64, 64}}

```
Table[ {n, Sum[ MoebiusMu[n / j] dz[j, 2, 0]^2, {j, Divisors[n]}], dz[n^2, 2, 0]}, {n, 1, 30}]
```

{{1, 1, 1}, {2, 3, 3}, {3, 3, 3}, {4, 5, 5}, {5, 3, 3}, {6, 9, 9}, {7, 3, 3}, {8, 7, 7}, {9, 5, 5},
{10, 9, 9}, {11, 3, 3}, {12, 15, 15}, {13, 3, 3}, {14, 9, 9}, {15, 9, 9}, {16, 9, 9},
{17, 3, 3}, {18, 15, 15}, {19, 3, 3}, {20, 15, 15}, {21, 9, 9}, {22, 9, 9}, {23, 3, 3},
{24, 21, 21}, {25, 5, 5}, {26, 9, 9}, {27, 7, 7}, {28, 15, 15}, {29, 3, 3}, {30, 27, 27}}

```
Table[Sum[ dz[j^3, 5, 0], {j, Divisors[n]}], {n, 1, 30}]
```

{1, 36, 36, 246, 36, 1296, 36, 961, 246, 1296, 36, 8856, 36, 1296, 1296, 2781,
36, 8856, 36, 8856, 1296, 1296, 36, 34 596, 246, 1296, 961, 8856, 36, 46 656}

```
bin[z_, k_] := Product[z - j, {j, 0, k - 1}] / k!
d2[n_, k_] := Sum[ d2[n / j, k - 1], {j, 2, n}]; d2[n_, 0] := UnitStep[n - 1]
d2z[n_, z_] := Sum[ bin[z, k] d2[n, k], {k, 0, Log[2, n]}]
dd2z[n_, z_] := d2z[n, z] - d2z[n - 1, z]
d3[n_, k_] := Sum[ d3[n / j, k - 1], {j, 3, n}]; d3[n_, 0] := UnitStep[n - 1]
d3z[n_, z_] := Sum[ bin[z, k] d3[n, k], {k, 0, Log[3, n]}]
dd3z[n_, z_] := d3z[n, z] - d3z[n - 1, z]
da[n_, k_, a_] := Sum[ da[n / (j + a), k - 1, a], {j, 1, n}]; da[n_, 0, a_] := UnitStep[n - 1]
daz[n_, z_, a_] := Sum[ bin[z, k] da[n, k, a], {k, 0, Log[a + 1, n]}]
ddaz[n_, z_, a_] := daz[n, z, a] - daz[n - 1, z, a]
```

```
Expand[Table[{n, (ddaz[n, z, 1])}, {n, 2, 100}] // TableForm]
```

2	z
3	z
4	$z+\frac{1}{2}(-1+z)z$
5	z
6	$z+(-1+z)z$
7	z
8	$z+(-1+z)z+\frac{1}{6}(-2+z)(-1+z)z$
9	$z+\frac{1}{2}(-1+z)z$
10	$z+(-1+z)z$
11	z
12	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
13	z
14	$z+(-1+z)z$
15	$z+(-1+z)z$
16	$z+\frac{3}{2}(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z+\frac{1}{24}(-3+z)(-2+z)(-1+z)z$
17	z
18	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
19	z
20	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
21	$z+(-1+z)z$
22	$z+(-1+z)z$
23	z
24	$z+3(-1+z)z+\frac{3}{2}(-2+z)(-1+z)z+\frac{1}{6}(-3+z)(-2+z)(-1+z)z$
25	$z+\frac{1}{2}(-1+z)z$
26	$z+(-1+z)z$
27	$z+(-1+z)z+\frac{1}{6}(-2+z)(-1+z)z$
28	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
29	z
30	$z+3(-1+z)z+(-2+z)(-1+z)z$
31	z
32	$z+2(-1+z)z+(-2+z)(-1+z)z+\frac{1}{6}(-3+z)(-2+z)(-1+z)z+\frac{1}{120}(-4+z)(-3+z)(-2+z)$
33	$z+(-1+z)z$
34	$z+(-1+z)z$
35	$z+(-1+z)z$
36	$z+\frac{7}{2}(-1+z)z+2(-2+z)(-1+z)z+\frac{1}{4}(-3+z)(-2+z)(-1+z)z$
37	z
38	$z+(-1+z)z$
39	$z+(-1+z)z$
40	$z+3(-1+z)z+\frac{3}{2}(-2+z)(-1+z)z+\frac{1}{6}(-3+z)(-2+z)(-1+z)z$
41	z
42	$z+3(-1+z)z+(-2+z)(-1+z)z$
43	z
44	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
45	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
46	$z+(-1+z)z$
47	z
48	$z+4(-1+z)z+3(-2+z)(-1+z)z+\frac{2}{3}(-3+z)(-2+z)(-1+z)z+\frac{1}{24}(-4+z)(-3+z)(-2+z)$

49	$z+\frac{1}{2}(-1+z)z$
50	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
51	$z+(-1+z)z$
52	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
53	z
54	$z+3(-1+z)z+\frac{3}{2}(-2+z)(-1+z)z+\frac{1}{6}(-3+z)(-2+z)(-1+z)z$
55	$z+(-1+z)z$
56	$z+3(-1+z)z+\frac{3}{2}(-2+z)(-1+z)z+\frac{1}{6}(-3+z)(-2+z)(-1+z)z$
57	$z+(-1+z)z$
58	$z+(-1+z)z$
59	z
60	$z+5(-1+z)z+\frac{7}{2}(-2+z)(-1+z)z+\frac{1}{2}(-3+z)(-2+z)(-1+z)z$
61	z
62	$z+(-1+z)z$
63	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
64	$z+\frac{5}{2}(-1+z)z+\frac{5}{3}(-2+z)(-1+z)z+\frac{5}{12}(-3+z)(-2+z)(-1+z)z+\frac{1}{24}(-4+z)(-3+z)(-2+$
65	$z+(-1+z)z$
66	$z+3(-1+z)z+(-2+z)(-1+z)z$
67	z
68	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
69	$z+(-1+z)z$
70	$z+3(-1+z)z+(-2+z)(-1+z)z$
71	z
72	$z+5(-1+z)z+\frac{9}{2}(-2+z)(-1+z)z+\frac{7}{6}(-3+z)(-2+z)(-1+z)z+\frac{1}{12}(-4+z)(-3+z)(-2+z$
73	z
74	$z+(-1+z)z$
75	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
76	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
77	$z+(-1+z)z$
78	$z+3(-1+z)z+(-2+z)(-1+z)z$
79	z
80	$z+4(-1+z)z+3(-2+z)(-1+z)z+\frac{2}{3}(-3+z)(-2+z)(-1+z)z+\frac{1}{24}(-4+z)(-3+z)(-2+z)$
81	$z+\frac{3}{2}(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z+\frac{1}{24}(-3+z)(-2+z)(-1+z)z$
82	$z+(-1+z)z$
83	z
84	$z+5(-1+z)z+\frac{7}{2}(-2+z)(-1+z)z+\frac{1}{2}(-3+z)(-2+z)(-1+z)z$
85	$z+(-1+z)z$
86	$z+(-1+z)z$
87	$z+(-1+z)z$
88	$z+3(-1+z)z+\frac{3}{2}(-2+z)(-1+z)z+\frac{1}{6}(-3+z)(-2+z)(-1+z)z$
89	z
90	$z+5(-1+z)z+\frac{7}{2}(-2+z)(-1+z)z+\frac{1}{2}(-3+z)(-2+z)(-1+z)z$
91	$z+(-1+z)z$
92	$z+2(-1+z)z+\frac{1}{2}(-2+z)(-1+z)z$
93	$z+(-1+z)z$
94	$z+(-1+z)z$
95	$z+(-1+z)z$
96	$z+5(-1+z)z+5(-2+z)(-1+z)z+\frac{5}{3}(-3+z)(-2+z)(-1+z)z+\frac{5}{24}(-4+z)(-3+z)(-2+z)$

97	z
98	$z+2\,(-1+z)\,z+\frac{1}{2}\,(-2+z)\,(-1+z)\,z$
99	$z+2\,(-1+z)\,z+\frac{1}{2}\,(-2+z)\,(-1+z)\,z$
100	$z+\frac{7}{2}\,(-1+z)\,z+2\,(-2+z)\,(-1+z)\,z+\frac{1}{4}\,(-3+z)\,(-2+z)\,(-1+z)\,z$

```
bin[z_, k_] := Product[z - j, {j, 0, k - 1}] / k!
E2a[n_, k_, x_, s_] := E2a[n, k, x, s] = Sum[ j^(-s) E2a[n / j, k - 1, x, s], {j, 2, n}] -
   x Sum[ (j x)^(-s) E2a[n / (x j), k - 1, x, s], {j, 1, n / x}];
E2a[n_, 0, a_, s_] := UnitStep[n - 1]
E1[n_, z_, x_, s_] :=
 E1[n, z, x, s] = Sum[ bin[z, k] E2a[n, k, x, s], {k, 0, Log[If[x < 2, x, 2], n]}]
e1[n_, z_, x_, s_] := E1[n, z, x, s] - E1[n - 1, z, x, s]
```

```
Expand[e1[100, z, 2, 0]]
```

$$-\frac{3 z^2}{4}-\frac{z^3}{2}+\frac{z^4}{4}$$

```
Expand[e1[100, z, 1.05, 0]]
```

$$0. - 9.77707\times 10^{-11} z - 1.34015 z^2 + 3.89813 z^3 - 7.32015 z^4 + 9.36244 z^5 - 8.6053 z^6 + 6.55789 z^7 - 4.04874 z^8 + 2.12208 z^9 - 0.943584 z^{10} + 0.35776 z^{11} - 0.116825 z^{12} + 0.0332317 z^{13} - 0.00832691 z^{14} + 0.00185612 z^{15} - 0.000371057 z^{16} + 0.0000669551 z^{17} - 0.0000109615 z^{18} + 1.63515\times 10^{-6} z^{19} - 2.23076\times 10^{-7} z^{20} + 2.79247\times 10^{-8} z^{21} - 3.21707\times 10^{-9} z^{22} + 3.42029\times 10^{-10} z^{23} - 3.36434\times 10^{-11} z^{24} + 3.06896\times 10^{-12} z^{25} - 2.60182\times 10^{-13} z^{26} + 2.05409\times 10^{-14} z^{27} - 1.51286\times 10^{-15} z^{28} + 1.04118\times 10^{-16} z^{29} - 6.70546\times 10^{-18} z^{30} + 4.04648\times 10^{-19} z^{31} - 2.29074\times 10^{-20} z^{32} + 1.21779\times 10^{-21} z^{33} - 6.08504\times 10^{-23} z^{34} + 2.86024\times 10^{-24} z^{35} - 1.2656\times 10^{-25} z^{36} + 5.27494\times 10^{-27} z^{37} - 2.07205\times 10^{-28} z^{38} + 7.67436\times 10^{-30} z^{39} - 2.6811\times 10^{-31} z^{40} + 8.83783\times 10^{-33} z^{41} - 2.74945\times 10^{-34} z^{42} + 8.07395\times 10^{-36} z^{43} - 2.23826\times 10^{-37} z^{44} + 5.85776\times 10^{-39} z^{45} - 1.44721\times 10^{-40} z^{46} + 3.37492\times 10^{-42} z^{47} - 7.42757\times 10^{-44} z^{48} + 1.5423\times 10^{-45} z^{49} - 3.02052\times 10^{-47} z^{50} + 5.57704\times 10^{-49} z^{51} - 9.70324\times 10^{-51} z^{52} + 1.58987\times 10^{-52} z^{53} - 2.45152\times 10^{-54} z^{54} + 3.55461\times 10^{-56} z^{55} - 4.84212\times 10^{-58} z^{56} + 6.19036\times 10^{-60} z^{57} - 7.41862\times 10^{-62} z^{58} + 8.32305\times 10^{-64} z^{59} - 8.72862\times 10^{-66} z^{60} + 8.54243\times 10^{-68} z^{61} - 7.78695\times 10^{-70} z^{62} + 6.59739\times 10^{-72} z^{63} - 5.18256\times 10^{-74} z^{64} + 3.76433\times 10^{-76} z^{65} - 2.52024\times 10^{-78} z^{66} + 1.54968\times 10^{-80} z^{67} - 8.71547\times 10^{-83} z^{68} + 4.46166\times 10^{-85} z^{69} - 2.06732\times 10^{-87} z^{70} + 8.61236\times 10^{-90} z^{71} - 3.20003\times 10^{-92} z^{72} + 1.05016\times 10^{-94} z^{73} - 3.0071\times 10^{-97} z^{74} + 7.3977\times 10^{-100} z^{75} - 1.532\times 10^{-102} z^{76} + 2.59716\times 10^{-105} z^{77} - 3.46094\times 10^{-108} z^{78} + 3.3995\times 10^{-111} z^{79} - 2.18828\times 10^{-114} z^{80} + 6.92494\times 10^{-118} z^{81}$$

```
ff[n_] := (Sign[Abs[n] - 1] + 1) / 2
```

```
fp[k_] := Sum[ Binomial[k, j] BernoulliB[k - j] / (j + 1) n^(j + 1), {j, 0, k}]
```

```
FullSimplify[fp[3]]
```

$$\frac{1}{4}\,(-1+n)^2\,n^2$$

```
fa[n_, a_] := N[(Sin[n] + (3 n - 3)^(1 / 2) - 1) Sum[
    BernoulliB[k] / k! D[ ((Sin[n] + (3 n - 3)^(1 / 2))^z), {z, k + a - 1}] /. z → 0, {k, 0, 200}]]
```

```
fa[100, 3]
```

22.3553

```
bin[z_, k_] := Product[z - j, {j, 0, k - 1}] / k!
D2[n_, k_, s_] := D2[n, k, s] = Sum[ j^-s D2[Floor[n / j], k - 1, s], {j, 2, n}];
D2[n_, 0, s_] := 1
Dz[n_, z_, s_] := Sum [ bin[ z, k] D2[n, k, s], {k, 0, Log[2, n]}]
```

```
1 + Integrate[ D[Dz[100, z, 0], z], {z, 0, 1}]
```

100

```
Dz[100, 3, 0]
```

1471

```
Expand[D[Dz[100, z, 0], z]]
```

$$\frac{428}{15}+\frac{16289\,z}{180}+\frac{993\,z^2}{16}+\frac{611\,z^3}{36}+\frac{67\,z^4}{48}+\frac{7\,z^5}{120}$$

```
FullSimplify[D[Dz[100, z, s], z] /. z → 0]
```

$$\frac{1}{3}2^{-1-6s}+2^{-1-2s}+\frac{2^{-5s}}{5}+\frac{2^{-3s}}{3}+2^{-s}+3^{-1-3s}+\frac{3^{-4s}}{4}+\frac{3^{-2s}}{2}+3^{-s}+4^{-1-2s}+\frac{5^{-2s}}{2}+5^{-s}+\frac{7^{-2s}}{2}+7^{-s}+11^{-s}+13^{-s}+17^{-s}+19^{-s}+23^{-s}+29^{-s}+31^{-s}+37^{-s}+41^{-s}+43^{-s}+47^{-s}+53^{-s}+59^{-s}+61^{-s}+67^{-s}+71^{-s}+73^{-s}+79^{-s}+83^{-s}+89^{-s}+97^{-s}$$

0 - Integrate$\left[\mathbf{D}\left[\frac{1}{3}2^{-1-6s}+2^{-1-2s}+\frac{2^{-5s}}{5}+\frac{2^{-3s}}{3}+2^{-s}+3^{-1-3s}+\frac{3^{-4s}}{4}+\frac{3^{-2s}}{2}+3^{-s}+4^{-1-2s}+\frac{5^{-2s}}{2}+5^{-s}+\frac{7^{-2s}}{2}+7^{-s}+11^{-s}+13^{-s}+17^{-s}+19^{-s}+23^{-s}+29^{-s}+31^{-s}+37^{-s}+41^{-s}+43^{-s}+47^{-s}+53^{-s}+59^{-s}+61^{-s}+67^{-s}+71^{-s}+73^{-s}+79^{-s}+83^{-s}+89^{-s}+97^{-s},\ s\right],\ \{s, 0, \text{Infinity}\}\right]$

$$\frac{428}{15}$$

```
Dz[100, 2, -1]
```

26879

```
1 - Expand[Integrate[ D[Dz[10, z, s], s], {s, 0, Infinity}]]
```

Integrate::idiv : Integral of
$-2^s z \text{Log}[2]+2^{2s} z \text{Log}[2]-2^{3s} z \text{Log}[2]+2^{-1+3s} z \text{Log}[2]+2^{-1+s}5^s z \text{Log}[2]+6^s z \text{Log}[2]-2^{2s}z^2\text{Log}[2]+2^{3s}z^2\text{Log}[2]-2^{-1+s}5^s z^2\text{Log}[2]-6^s z^2\text{Log}[2]-2^{-1+3s}z^3\text{Log}[2]-3^s z\text{Log}[3]+3^{2s}z\text{Log}[3]+6^s z\text{Log}[3]-3^{2s}z^2\text{Log}[3]-6^s z^2\text{Log}[3]+2^{-1+3s}z\text{Log}[4]-4^s z\text{Log}[4]-2^{-1+3s}z^2\text{Log}[4]-5^s z\text{Log}[5]+2^{-1+s}5^s z\text{Log}[5]-2^{-1+s}5^s z^2\text{Log}[5]-6^s z\text{Log}[6]-7^s z\text{Log}[7]+2^{-1+3s}z\text{Log}[8]-8^s z\text{Log}[8]-2^{-1+3s}z^2\text{Log}[8]-9^s z\text{Log}[9]+2^{-1+s}5^s z\text{Log}[10]-10^s z\text{Log}[10]-2^{-1+s}5^s z^2\text{Log}[10]$ does not converge on $\{0, \infty\}$. ≫

$$1-\int_0^{-\infty}\Big(-2^{-1-3s}(-2+z)(-1+z)\,z\,\text{Log}[2]+\frac{1}{2}(-1+z)\,z\,\big(-2^{-s}(2^{-s}+3^{-s}+4^{-s}+5^{-s})\text{Log}[2]-3^{-s}(2^{-s}+3^{-s})\text{Log}[3]+3^{-s}(-2^{-s}\text{Log}[2]-3^{-s}\text{Log}[3])+2^{-s}(-2^{-s}\text{Log}[2]-3^{-s}\text{Log}[3]-4^{-s}\text{Log}[4]-5^{-s}\text{Log}[5])-8^{-s}\text{Log}[8]-10^{-s}\text{Log}[10]\big)+z\,(-2^{-s}\text{Log}[2]-3^{-s}\text{Log}[3]-4^{-s}\text{Log}[4]-5^{-s}\text{Log}[5]-6^{-s}\text{Log}[6]-7^{-s}\text{Log}[7]-8^{-s}\text{Log}[8]-9^{-s}\text{Log}[9]-10^{-s}\text{Log}[10])\Big)\,ds$$

```
Expand[Dz[10, z, -1]]
```

$$1 + \frac{157\,z}{6} + \frac{53\,z^2}{2} + \frac{4\,z^3}{3}$$

```
Expand[FullSimplify[1 - Expand[Integrate[ D[Dz[10, z, s], s], {s, -1, Infinity}]]]]
```

$$1 + \frac{157\,z}{6} + \frac{53\,z^2}{2} + \frac{4\,z^3}{3}$$

```
D[n^z, z]
FullSimplify[Integrate[ n^z Log[n], {z, 1, 2}]]
```

$(-1 + n)\,n$

```
FullSimplify[Integrate[ n^z Log[n], {z, 3, 2}]]
```

$-(-1 + n)\,n^2$

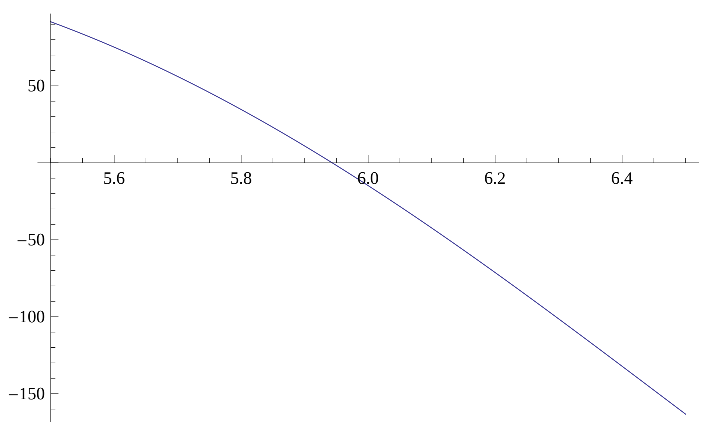
```
Integrate[ D[ fn[x], x], {x, 0, 100}]
```

-fn[0] + fn[100]

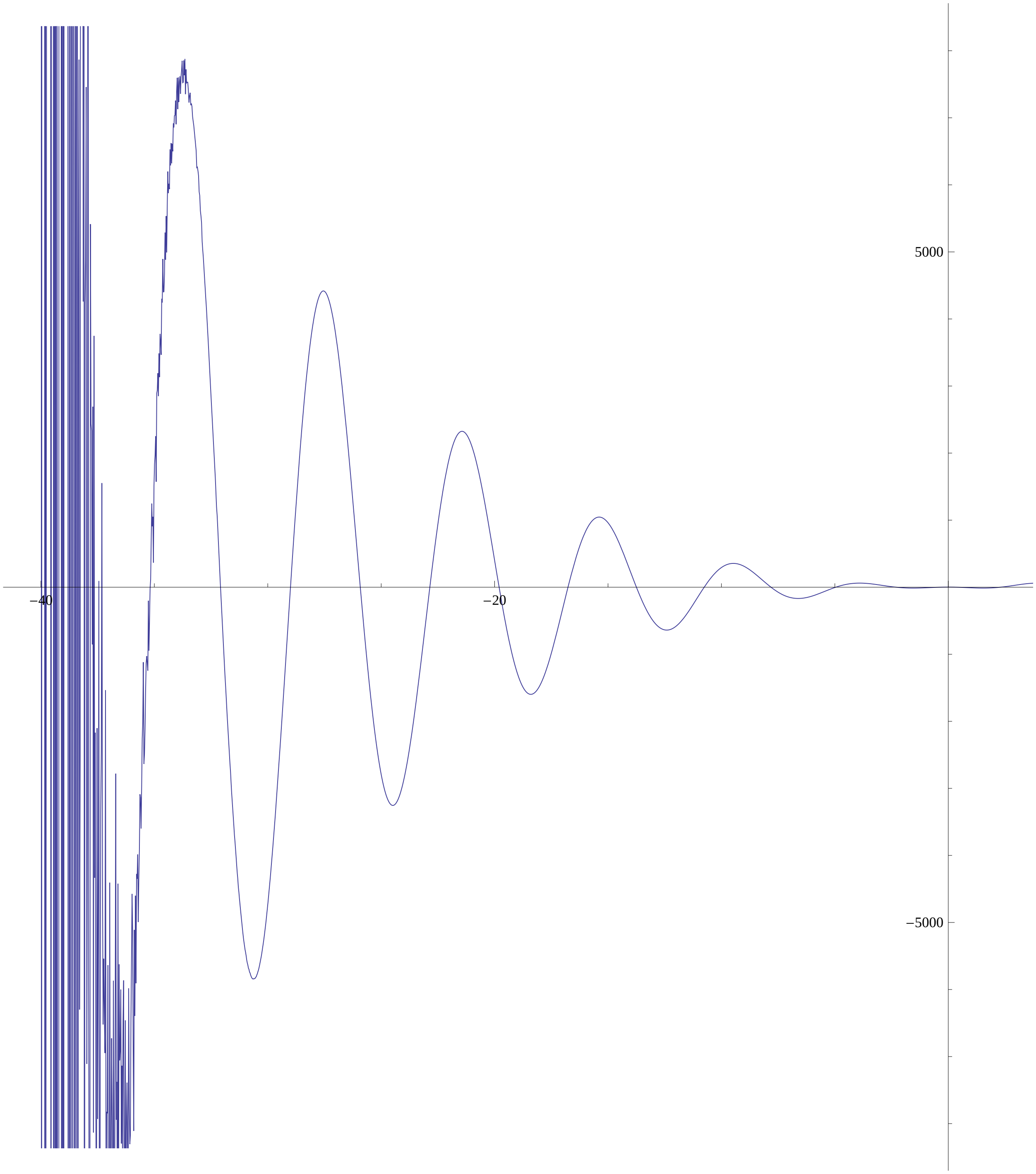
```
{Limit[y^(s - 1) HurwitzZeta[s, y + 1], y → Infinity], 1 / (s - 1)}
```

$$\left\{\frac{1}{-1 + s}, \frac{1}{-1 + s}\right\}$$

```
bin[z_, k_] := Product[z - j, {j, 0, k - 1}] / k!
D2[n_, k_, s_] := D2[n, k, s] = Sum[ j^-s D2[Floor[n / j], k - 1, s], {j, 2, n}];
D2[n_, 0, s_] := 1
Dz[n_, z_, s_] := Sum [ bin[ z, k] D2[n, k, s], {k, 0, Log[2, n]}]
sind[ n_, z_, s_, t_] := Sum[ z^k (D[Sin[x], {x, k}] /. x → 0) / k! Dz[ n, k, s], {k, 0, t}]
cosd[ n_, z_, s_, t_] := Sum[ z^k (D[Cos[x], {x, k}] /. x → 0) / k! Dz[ n, k, s], {k, 0, t}]
Plot[ N[sind[ 12, s, 0, 80]], {s, 5.5, 6.5}]
```



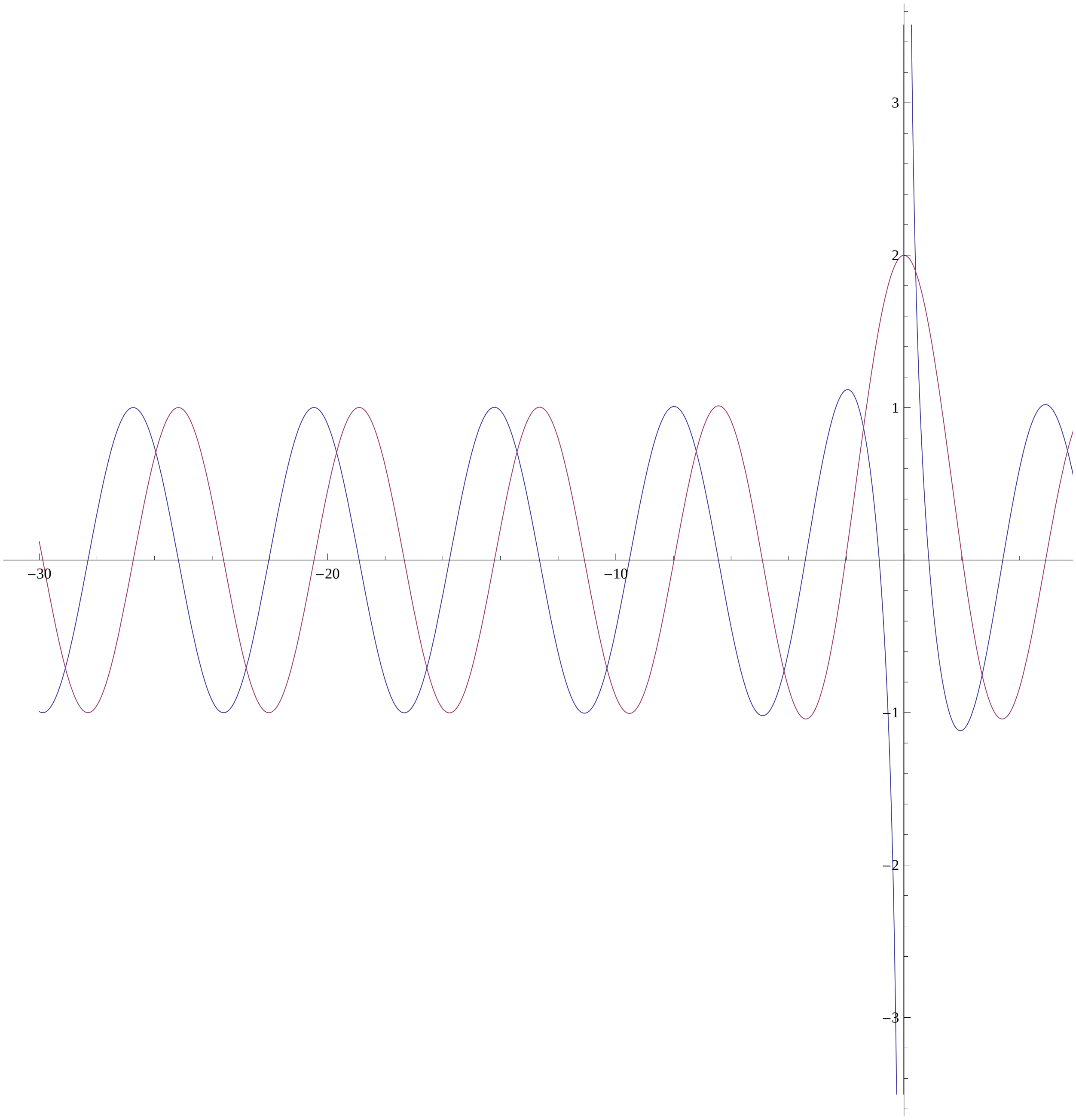

```
Plot[ N[cosd[ 10, s, 0, 200]], {s, -40, 40}]
```



sind[10, N[2 Pi], 0, 90]

15.207

```
Plot[{N[cosd[E, s, 0, 200]] / s, N[sind[E, s, 0, 200]] / s}, {s, -30, 30}]
```



```
Plot[{Cos[s], Sin[s]}, {s, -30, 30}]
```


```
Table[{s, N[cosd[E, s, 0, 400]] / s}, {s, 4, 18, .01}] // TableForm
```

4.	0.593392
4.01	0.602193
4.02	0.610923
4.03	0.61958
4.04	0.628163
4.05	0.636673
4.06	0.645107
4.07	0.653465
4.08	0.661747
4.09	0.669951

4.1	0.678076
4.11	0.686122
4.12	0.694089
4.13	0.701974
4.14	0.709778
4.15	0.7175
4.16	0.725138
4.17	0.732693
4.18	0.740163
4.19	0.747548
4.2	0.754847
4.21	0.762059
4.22	0.769184
4.23	0.776221
4.24	0.783169
4.25	0.790028
4.26	0.796796
4.27	0.803474
4.28	0.81006
4.29	0.816555
4.3	0.822957
4.31	0.829265
4.32	0.83548
4.33	0.841601
4.34	0.847626
4.35	0.853556
4.36	0.85939
4.37	0.865127
4.38	0.870767
4.39	0.87631
4.4	0.881754
4.41	0.887099
4.42	0.892345
4.43	0.897492
4.44	0.902538
4.45	0.907484
4.46	0.912328
4.47	0.917071
4.48	0.921712
4.49	0.926251
4.5	0.930687
4.51	0.935019
4.52	0.939248
4.53	0.943374
4.54	0.947394
4.55	0.951311
4.56	0.955122
4.57	0.958828
4.58	0.962428
4.59	0.965922
4.6	0.96931
4.61	0.972591
4.62	0.975766
4.63	0.978833
4.64	0.981794
4.65	0.984646

4.66	0.987391
4.67	0.990028
4.68	0.992556
4.69	0.994976
4.7	0.997287
4.71	0.99949
4.72	1.00158
4.73	1.00357
4.74	1.00544
4.75	1.00721
4.76	1.00887
4.77	1.01041
4.78	1.01185
4.79	1.01318
4.8	1.01439
4.81	1.0155
4.82	1.0165
4.83	1.01739
4.84	1.01816
4.85	1.01883
4.86	1.01939
4.87	1.01983
4.88	1.02017
4.89	1.0204
4.9	1.02052
4.91	1.02052
4.92	1.02042
4.93	1.02021
4.94	1.01989
4.95	1.01945
4.96	1.01891
4.97	1.01826
4.98	1.0175
4.99	1.01663
5.	1.01566
5.01	1.01457
5.02	1.01337
5.03	1.01207
5.04	1.01066
5.05	1.00914
5.06	1.00751
5.07	1.00578
5.08	1.00393
5.09	1.00198
5.1	0.999928
5.11	0.997765
5.12	0.995496
5.13	0.99312
5.14	0.99064
5.15	0.988053
5.16	0.985362
5.17	0.982566
5.18	0.979666
5.19	0.976662
5.2	0.973554
5.21	0.970343

5.22	0.967029
5.23	0.963613
5.24	0.960095
5.25	0.956475
5.26	0.952753
5.27	0.948932
5.28	0.94501
5.29	0.940988
5.3	0.936866
5.31	0.932646
5.32	0.928328
5.33	0.923911
5.34	0.919398
5.35	0.914787
5.36	0.91008
5.37	0.905277
5.38	0.900379
5.39	0.895387
5.4	0.8903
5.41	0.88512
5.42	0.879847
5.43	0.874481
5.44	0.869024
5.45	0.863476
5.46	0.857837
5.47	0.852108
5.48	0.84629
5.49	0.840384
5.5	0.834389
5.51	0.828308
5.52	0.822139
5.53	0.815885
5.54	0.809546
5.55	0.803122
5.56	0.796614
5.57	0.790024
5.58	0.783351
5.59	0.776596
5.6	0.769761
5.61	0.762845
5.62	0.75585
5.63	0.748776
5.64	0.741625
5.65	0.734396
5.66	0.727092
5.67	0.719712
5.68	0.712257
5.69	0.704728
5.7	0.697126
5.71	0.689452
5.72	0.681707
5.73	0.673891
5.74	0.666006
5.75	0.658052
5.76	0.650029
5.77	0.64194

5.78	0.633784
5.79	0.625563
5.8	0.617278
5.81	0.608929
5.82	0.600517
5.83	0.592044
5.84	0.583509
5.85	0.574915
5.86	0.566262
5.87	0.55755
5.88	0.548782
5.89	0.539957
5.9	0.531076
5.91	0.522142
5.92	0.513154
5.93	0.504114
5.94	0.495022
5.95	0.485879
5.96	0.476687
5.97	0.467447
5.98	0.458159
5.99	0.448824
6.	0.439444
6.01	0.430019
6.02	0.420551
6.03	0.411039
6.04	0.401487
6.05	0.391894
6.06	0.382261
6.07	0.372589
6.08	0.36288
6.09	0.353135
6.1	0.343354
6.11	0.333539
6.12	0.32369
6.13	0.313809
6.14	0.303896
6.15	0.293954
6.16	0.283982
6.17	0.273981
6.18	0.263954
6.19	0.2539
6.2	0.243822
6.21	0.23372
6.22	0.223594
6.23	0.213447
6.24	0.203279
6.25	0.193091
6.26	0.182885
6.27	0.172661
6.28	0.16242
6.29	0.152164
6.3	0.141894
6.31	0.13161
6.32	0.121314
6.33	0.111007

6.34	0.10069
6.35	0.0903639
6.36	0.0800299
6.37	0.069689
6.38	0.0593423
6.39	0.0489909
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6.45	−0.0131555
6.46	−0.0235095
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6.48	−0.0442048
6.49	−0.0545438
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6.54	−0.10611
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6.63	−0.198055
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6.66	−0.228345
6.67	−0.238392
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6.71	−0.278312
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6.73	−0.298094
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6.75	−0.317747
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6.77	−0.337262
6.78	−0.346966
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6.81	−0.37585
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6.85	−0.413792
6.86	−0.42317
6.87	−0.432502
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6.89	−0.451028

6.9	−0.460219
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6.98	−0.531908
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7.	−0.549286
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7.08	−0.616406
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7.1	−0.632554
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7.12	−0.648436
7.13	−0.656275
7.14	−0.664045
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7.16	−0.679375
7.17	−0.686934
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7.27	−0.758435
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7.41	−0.845081
7.42	−0.850629
7.43	−0.856089
7.44	−0.86146
7.45	−0.86674

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7.47	−0.877031
7.48	−0.88204
7.49	−0.886957
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7.51	−0.896514
7.52	−0.901153
7.53	−0.905699
7.54	−0.91015
7.55	−0.914507
7.56	−0.918769
7.57	−0.922936
7.58	−0.927006
7.59	−0.930981
7.6	−0.934859
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7.62	−0.942324
7.63	−0.94591
7.64	−0.949398
7.65	−0.952788
7.66	−0.956079
7.67	−0.959271
7.68	−0.962364
7.69	−0.965357
7.7	−0.96825
7.71	−0.971042
7.72	−0.973735
7.73	−0.976326
7.74	−0.978817
7.75	−0.981206
7.76	−0.983494
7.77	−0.98568
7.78	−0.987764
7.79	−0.989746
7.8	−0.991626
7.81	−0.993403
7.82	−0.995078
7.83	−0.99665
7.84	−0.998119
7.85	−0.999485
7.86	−1.00075
7.87	−1.00191
7.88	−1.00296
7.89	−1.00392
7.9	−1.00476
7.91	−1.00551
7.92	−1.00615
7.93	−1.00669
7.94	−1.00712
7.95	−1.00745
7.96	−1.00768
7.97	−1.0078
7.98	−1.00782
7.99	−1.00773
8.	−1.00755
8.01	−1.00725

8.02	−1.00686
8.03	−1.00636
8.04	−1.00575
8.05	−1.00504
8.06	−1.00423
8.07	−1.00332
8.08	−1.0023
8.09	−1.00118
8.1	−0.999957
8.11	−0.99863
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8.14	−0.994035
8.15	−0.992299
8.16	−0.99046
8.17	−0.98852
8.18	−0.986478
8.19	−0.984335
8.2	−0.982091
8.21	−0.979746
8.22	−0.9773
8.23	−0.974754
8.24	−0.972108
8.25	−0.969362
8.26	−0.966516
8.27	−0.963571
8.28	−0.960528
8.29	−0.957385
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8.32	−0.947371
8.33	−0.943838
8.34	−0.940208
8.35	−0.936482
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8.37	−0.928742
8.38	−0.924729
8.39	−0.920621
8.4	−0.916419
8.41	−0.912123
8.42	−0.907734
8.43	−0.903251
8.44	−0.898676
8.45	−0.894009
8.46	−0.889251
8.47	−0.884402
8.48	−0.879462
8.49	−0.874432
8.5	−0.869312
8.51	−0.864104
8.52	−0.858807
8.53	−0.853422
8.54	−0.84795
8.55	−0.842391
8.56	−0.836747
8.57	−0.831016

8.58	−0.825201
8.59	−0.819301
8.6	−0.813318
8.61	−0.807252
8.62	−0.801103
8.63	−0.794872
8.64	−0.78856
8.65	−0.782167
8.66	−0.775695
8.67	−0.769144
8.68	−0.762513
8.69	−0.755806
8.7	−0.749021
8.71	−0.742159
8.72	−0.735222
8.73	−0.72821
8.74	−0.721123
8.75	−0.713963
8.76	−0.706731
8.77	−0.699426
8.78	−0.69205
8.79	−0.684603
8.8	−0.677087
8.81	−0.669502
8.82	−0.661848
8.83	−0.654127
8.84	−0.646339
8.85	−0.638486
8.86	−0.630568
8.87	−0.622585
8.88	−0.614539
8.89	−0.606431
8.9	−0.598261
8.91	−0.59003
8.92	−0.581739
8.93	−0.573389
8.94	−0.56498
8.95	−0.556515
8.96	−0.547992
8.97	−0.539414
8.98	−0.530782
8.99	−0.522095
9.	−0.513355
9.01	−0.504563
9.02	−0.49572
9.03	−0.486827
9.04	−0.477885
9.05	−0.468893
9.06	−0.459855
9.07	−0.45077
9.08	−0.441639
9.09	−0.432463
9.1	−0.423244
9.11	−0.413981
9.12	−0.404677
9.13	−0.395332

9.14	−0.385947
9.15	−0.376523
9.16	−0.367061
9.17	−0.357562
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9.19	−0.338456
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9.21	−0.319213
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9.23	−0.299842
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9.27	−0.260746
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9.29	−0.241037
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9.36	−0.171346
9.37	−0.161314
9.38	−0.151266
9.39	−0.141203
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9.44	−0.0906985
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9.46	−0.0704279
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9.52	−0.00948795
9.53	0.000676538
9.54	0.0108405
9.55	0.0210029
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9.58	0.0514703
9.59	0.0616161
9.6	0.0717551
9.61	0.0818864
9.62	0.0920088
9.63	0.102121
9.64	0.112223
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9.66	0.13239
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9.68	0.152501
9.69	0.162533

9.7	0.172548
9.71	0.182545
9.72	0.192523
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9.74	0.212417
9.75	0.222332
9.76	0.232223
9.77	0.24209
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9.79	0.261749
9.8	0.271538
9.81	0.281299
9.82	0.29103
9.83	0.300732
9.84	0.310403
9.85	0.320041
9.86	0.329647
9.87	0.339218
9.88	0.348755
9.89	0.358255
9.9	0.367719
9.91	0.377144
9.92	0.386531
9.93	0.395878
9.94	0.405184
9.95	0.414449
9.96	0.423671
9.97	0.432849
9.98	0.441983
9.99	0.451072
10.	0.460114
10.01	0.469109
10.02	0.478055
10.03	0.486953
10.04	0.495801
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10.06	0.513342
10.07	0.522035
10.08	0.530673
10.09	0.539258
10.1	0.547787
10.11	0.55626
10.12	0.564675
10.13	0.573033
10.14	0.581333
10.15	0.589572
10.16	0.597752
10.17	0.60587
10.18	0.613926
10.19	0.621919
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10.21	0.637714
10.22	0.645514
10.23	0.653247
10.24	0.660914
10.25	0.668514

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10.27	0.683506
10.28	0.690898
10.29	0.69822
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10.32	0.719752
10.33	0.726784
10.34	0.733741
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10.38	0.760813
10.39	0.767389
10.4	0.773886
10.41	0.780304
10.42	0.786642
10.43	0.7929
10.44	0.799077
10.45	0.805173
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10.47	0.817117
10.48	0.822964
10.49	0.828728
10.5	0.834407
10.51	0.84
10.52	0.845508
10.53	0.85093
10.54	0.856265
10.55	0.861512
10.56	0.866672
10.57	0.871744
10.58	0.876726
10.59	0.881619
10.6	0.886423
10.61	0.891136
10.62	0.895758
10.63	0.900289
10.64	0.904728
10.65	0.909075
10.66	0.913329
10.67	0.91749
10.68	0.921558
10.69	0.925532
10.7	0.929412
10.71	0.933197
10.72	0.936887
10.73	0.940481
10.74	0.94398
10.75	0.947383
10.76	0.950689
10.77	0.953898
10.78	0.957011
10.79	0.960026
10.8	0.962943
10.81	0.965762

10.82	0.968483
10.83	0.971105
10.84	0.973629
10.85	0.976053
10.86	0.978378
10.87	0.980604
10.88	0.98273
10.89	0.984756
10.9	0.986681
10.91	0.988507
10.92	0.990231
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10.94	0.993379
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10.98	0.99846
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11.08	1.00405
11.09	1.00405
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11.17	1.00036
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11.24	0.991807
11.25	0.99018
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11.27	0.986627
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11.08 - 4.91

6.17