```
Clear[pp, dez]
bin[z_, k_] := bin[z, k] = Product[z - j, {j, 0, k - 1}] / k!
FI[n_] := FactorInteger[n]; FI[1] := {}
bin[z_, k_] := bin[z, k] = Product[z - j, {j, 0, k - 1}] / k!
pp[n_, s_, k_] := pp[n, s, k] = Sum[ m^(-s j) pp[n - j, s, k - 1], {j, 1, n - 1}]
pp[n_, s_, 1] := m^(-s n)
pp[n_, s_, 0] := If[n == 0, 1, 0]
pss[n_, s_, z_] := Sum[ bin[z, k] pp[n, s, k], {k, 0, n}]
pass[n_, s_, z_] := Sum[pss[j, s, z], {j, 1, n}]
dez[n_, z_] := Product[z^p[[2]] / (p[[2]]!), {p, FI[n]}]


Expand@Table[D[pss[n, -1, z], z] /. z → 0, {n, 1, 10}]
```

$$\left\{m, \frac{m^2}{2}, \frac{m^3}{3}, \frac{m^4}{4}, \frac{m^5}{5}, \frac{m^6}{6}, \frac{m^7}{7}, \frac{m^8}{8}, \frac{m^9}{9}, \frac{m^{10}}{10}\right\}$$

```
Table[pss[n, -s, 3], {n, 1, 10}]
```

$$\left\{3\,m^s,\ 6\,m^{2\,s},\ 10\,m^{3\,s},\ 15\,m^{4\,s},\ 21\,m^{5\,s},\ 28\,m^{6\,s},\ 36\,m^{7\,s},\ 45\,m^{8\,s},\ 55\,m^{9\,s},\ 66\,m^{10\,s}\right\}$$

```
FullSimplify@Table[pss[n, s, z], {n, 1, 10}] // TableForm
```

$$m^{-s}\,z$$

$$\frac{1}{2}\,m^{-2\,s}\,z\,(1+z)$$

$$\frac{1}{6}\,m^{-3\,s}\,z\,(1+z)\,(2+z)$$

$$\frac{1}{24}\,m^{-4\,s}\,z\,(1+z)\,(2+z)\,(3+z)$$

$$\frac{1}{120}\,m^{-5\,s}\,z\,(1+z)\,(2+z)\,(3+z)\,(4+z)$$

$$\frac{1}{720}\,m^{-6\,s}\,z\,(1+z)\,(2+z)\,(3+z)\,(4+z)\,(5+z)$$

$$\frac{m^{-7\,s}\,z\,(1+z)\,(2+z)\,(3+z)\,(4+z)\,(5+z)\,(6+z)}{5040}$$

$$\frac{m^{-8\,s}\,z\,(1+z)\,(2+z)\,(3+z)\,(4+z)\,(5+z)\,(6+z)\,(7+z)}{40\,320}$$

$$\frac{m^{-9\,s}\,z\,(1+z)\,(2+z)\,(3+z)\,(4+z)\,(5+z)\,(6+z)\,(7+z)\,(8+z)}{362\,880}$$

$$\frac{m^{-10\,s}\,z\,(1+z)\,(2+z)\,(3+z)\,(4+z)\,(5+z)\,(6+z)\,(7+z)\,(8+z)\,(9+z)}{3\,628\,800}$$

```
Sum[ Binomial[z, k], {k, 0, Infinity}]
```

$$2^z$$

```
Sum[ Binomial[z, k] x^(-s k), {k, 0, Infinity}]
```

$$(1+x^{-s})^z$$

```
Sum[ Pochhammer[z, k] / k! x^(-s k), {k, 0, Infinity}]
```

$$(1-x^{-s})^{-z}$$

```
Sum[ z^k / k! x^(-s k), {k, 0, Infinity}]
```

$$e^{x^{-s}\,z}$$

```
Sum[ Pochhammer[z, k] / k! x^(-s k), {k, 0, Infinity}]
```

$$(1-x^{-s})^{-z}$$

```
(1 - x^-s)^-z /. x → 5 /. z → 1 /. s → 2
```

$$\frac{25}{24}$$

```
Sum[ z^k / k! x^(-s k), {k, 0, Infinity}]
```

$$e^{x^{-s} z}$$

```
e^(x^-s z) /. z → 1 /. x → 5 /. s → 2
```

$$e^{1/25}$$

```
N@Product[ E^(1 / Prime[j]^2), {j, 1, 100 000}]
```

```
1.57184
```

```
N@Pi^2 / 6
```

```
1.64493
```

```
N@Product[ E^(1 / Prime[j]^2), {j, 1, 1 000 000}]
```

```
$Aborted
```

```
N@Product[ E^(1 / Prime[j]^3), {j, 1, 100 000}]
```

```
1.19096
```

```
Table[N@Pi^3 / n, {n, 1, 50}]
```

```
{31.0063, 15.5031, 10.3354, 7.75157, 6.20126, 5.16771, 4.42947, 3.87578,
 3.44514, 3.10063, 2.81875, 2.58386, 2.3851, 2.21473, 2.06709, 1.93789, 1.8239,
 1.72257, 1.63191, 1.55031, 1.47649, 1.40938, 1.3481, 1.29193, 1.24025, 1.19255,
 1.14838, 1.10737, 1.06918, 1.03354, 1.0002, 0.968946, 0.939584, 0.911949,
 0.885894, 0.861285, 0.838007, 0.815955, 0.795033, 0.775157, 0.756251, 0.738245,
 0.721076, 0.704688, 0.689028, 0.674049, 0.659708, 0.645964, 0.632781, 0.620126}
```

```
N@Product[ E^(1 / Prime[j]), {j, 1, 10 000}]
```

```
15.0181
```

```
N@Product[ E^(1 / Prime[j]), {j, 1, 100 000}]
```

```
18.2862
```

```
N@Product[ Zeta[2 k]^(MoebiusMu[k] / k), {k, 1, 400}]
```

```
1.57184
```

```
N@Product[ Zeta[2 k], {k, 1, Infinity}]
```

```
1.82102
```

```
N@Product[ Zeta[3 k]^(MoebiusMu[k] / k), {k, 1, 1000}]
```

```
1.19096
```

```
N[Zeta[3]]
```

```
1.20206
```

```
N@Product[ Zeta[ZetaZero[2] / 6 k]^(MoebiusMu[k] / k), {k, 1, 100}]
```

```
0.
```

```
N@Sum[ MoebiusMu[k] / k, {k, 1, 100}]
```

```
0.0311315
```

```
Zeta[1]^-1
```

```
0
```

```
N@Product[ Zeta[4 k]^(MoebiusMu[k] / k), {k, 1, 400}]
```

```
1.08003
```

```
Zeta[4.] / (Pi^4)
```

```
0.0111111
```

```
1.0800346670613987` / (Pi^4)
```

```
0.0110876
```

```
1.5718408053876343` / (Pi^2)
```

```
0.159261
```

```
Zeta[2.] / (Pi^2)
```

```
0.166667
```

```
Table[dez[n, 1], {n, 1, 12}]
```

$$\left\{1, 1, 1, \frac{1}{2}, 1, 1, 1, \frac{1}{6}, \frac{1}{2}, 1, 1, \frac{1}{2}\right\}$$

```
Clear[de]
de[n_, s_, k_] := de[n, s, k] = Sum[ dez[j, 1] j^(-s) de[Floor[n / j], s, k - 1], {j, 2, n}]
de[n_, s_, 0] := UnitStep[n - 1]
edz[n_, s_, z_] := Sum[bin[z, k] de[n, s, k], {k, 0, Log2@n}]
```

```
N@Table[edz[n, 2, 1], {n, 1, 20}]
```

```
{1., 1.25, 1.36111, 1.39236, 1.43236, 1.46014, 1.48055, 1.48315, 1.48932, 1.49932, 1.50759,
 1.51106, 1.51698, 1.52208, 1.52652, 1.52669, 1.53015, 1.53169, 1.53446, 1.53571}
```

```
Table[N@ ZetaZero[1] / k, {k, 1, 50}]
```

```
{0.5 + 14.1347 i, 0.25 + 7.06736 i, 0.166667 + 4.71158 i, 0.125 + 3.53368 i, 0.1 + 2.82695 i,
 0.0833333 + 2.35579 i, 0.0714286 + 2.01925 i, 0.0625 + 1.76684 i, 0.0555556 + 1.57053 i,
 0.05 + 1.41347 i, 0.0454545 + 1.28498 i, 0.0416667 + 1.17789 i, 0.0384615 + 1.08729 i,
 0.0357143 + 1.00962 i, 0.0333333 + 0.942315 i, 0.03125 + 0.88342 i, 0.0294118 + 0.831454 i,
 0.0277778 + 0.785263 i, 0.0263158 + 0.743933 i, 0.025 + 0.706736 i, 0.0238095 + 0.673082 i,
 0.0227273 + 0.642488 i, 0.0217391 + 0.614553 i, 0.0208333 + 0.588947 i,
 0.02 + 0.565389 i, 0.0192308 + 0.543643 i, 0.0185185 + 0.523508 i, 0.0178571 + 0.504812 i,
 0.0172414 + 0.487404 i, 0.0166667 + 0.471158 i, 0.016129 + 0.455959 i, 0.015625 + 0.44171 i,
 0.0151515 + 0.428325 i, 0.0147059 + 0.415727 i, 0.0142857 + 0.403849 i,
 0.0138889 + 0.392631 i, 0.0135135 + 0.38202 i, 0.0131579 + 0.371966 i, 0.0128205 + 0.362429 i,
 0.0125 + 0.353368 i, 0.0121951 + 0.344749 i, 0.0119048 + 0.336541 i, 0.0116279 + 0.328715 i,
 0.0113636 + 0.321244 i, 0.0111111 + 0.314105 i, 0.0108696 + 0.307277 i,
 0.0106383 + 0.300739 i, 0.0104167 + 0.294473 i, 0.0102041 + 0.288464 i, 0.01 + 0.282695 i}
```

```
N@Product[ (Zeta[k ZetaZero[1] / 100])^(MoebiusMu[k] / k), {k, 1, 400}]
```

```
Power::indet : Indeterminate expression 0^0 encountered. ≫
Indeterminate
```

```
N[ZetaZero[1] / 100]
```

```
0.005 + 0.141347 i
```

```
data = Flatten@Table[ZetaZero[n] / k, {n, 1, 500}, {k, 1, 20}];

p = ListPlot[{Re[#], Im[#]} & /@ data, AxesOrigin → {0, 0},
    PlotRange → {{0, 1}, {0, 100}}, ImagePadding → 40, AspectRatio → 1,
    Frame → True, FrameLabel → {{Im, None}, {Re, "complex plane"}},
    PlotStyle → Directive[Red, PointSize[.002]]];

Show[p, Graphics@Circle[{0, 0}, .01]]


Clear[de, ede, edeo, alt2l]
dee[n_, s_, z_] := Sum[ j^(-s) dez[j, z], {j, 1, n}]
deee[n_, s_, z_] := Sum[ N[j^(-s) dez[j, z]], {j, 1, n}]
rootsa[n_, s_] := If[(c = Exponent[f = deee[n, s, z], z]) == 0, {},
  If[c == 1, List@Roots[f == 0, z][[2]], List @@ Roots[f == 0, z][[All, 2]]]]
de[n_, s_, k_] := de[n, s, k] = Sum[ dez[j, 1] j^(-s) de[Floor[n / j], s, k - 1], {j, 2, n}]
de[n_, s_, 0] := UnitStep[n - 1]
edz[n_, s_, z_] := Sum[bin[z, k] de[n, s, k], {k, 0, Log2@n}]
ede[n_, s_, k_] :=
 ede[n, s, k] = Sum[ (-1)^(j + 1) dez[j, 1] j^(-s) ede[Floor[n / j], s, k - 1], {j, 2, n}]
ede[n_, s_, 0] := UnitStep[n - 1]
eedz[n_, s_, z_] := Sum[bin[z, k] ede[n, s, k], {k, 0, Log2@n}]
edeo[n_, s_, k_] :=
 edeo[n, s, k] = Sum[ (-1)^(j + 1) j^(-s) edeo[Floor[n / j], s, k - 1], {j, 2, n}]
edeo[n_, s_, 0] := UnitStep[n - 1]
eedoz[n_, s_, z_] := Sum[bin[z, k] edeo[n, s, k], {k, 0, Log2@n}]
is2[j_] := is2[j] = FullSimplify[If[Log[2, j] == Floor[Log[2, j]],
    2^(1 / (MangoldtLambda[j] / Log[j])) (MangoldtLambda[j] / Log[j]), 0]]
alt2l[n_, s_, k_] := alt2l[n, s, k] = Sum[( Floor[MangoldtLambda[j] / Log[j]] - is2[j])
    alt2l[Floor[n / j], s, k - 1], {j, 2, n}]
alt2l[n_, s_, 0] := UnitStep[n - 1]
altz[n_, s_, z_] := Sum[z^k / (k!) alt2l[n, s, k], {k, 0, Log2@n}]

Table[D[eedz[n, 0, z] - eedz[n - 1, 0, z], z] /. z → 0, {n, 2, 100}]
```

$$\left\{-1, 1, -1, 1, 0, 1, -1, 0, 0, 1, 0, 1, 0, 0, -\frac{13}{12}, 1, 0, 1, 0, 0, 0,\right.$$
$$1, 0, 0, 0, 0, 0, 1, 0, 1, -\frac{5}{4}, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0,$$
$$0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, -\frac{541}{360}, 0, 0, 1, 0, 0, 0, 1, 0, 1,$$
$$\left.0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0\right\}$$

```
Table[D[eedz[2^n, 0, z] - eedz[2^n - 1, 0, z], z] /. z → 0, {n, 1, 12}]
```

$$\left\{-1, -1, -1, -\frac{13}{12}, -\frac{5}{4}, -\frac{541}{360}, -\frac{223}{120}, -\frac{47\,293}{20\,160}, -\frac{36\,389}{12\,096}, -\frac{7\,087\,261}{1\,814\,400}, -\frac{3\,098\,411}{604\,800}, -\frac{1\,622\,632\,573}{239\,500\,800}\right\}$$

```
(* https://oeis.org/A000629 *)
Table[(D[eedz[2^n, 0, z] - eedz[2^n - 1, 0, z], z] /. z → 0) (n!), {n, 1, 12}]
```

$$\{-1, -2, -6, -26, -150, -1082, -9366,$$
$$-94\,586, -1\,091\,670, -14\,174\,522, -204\,495\,126, -3\,245\,265\,146\}$$

```
Table[-PolyLog[-n + 1, 1 / 2] / n!, {n, 1, 12}]
```

$$\left\{-1, -1, -1, -\frac{13}{12}, -\frac{5}{4}, -\frac{541}{360}, -\frac{223}{120}, -\frac{47\,293}{20\,160}, -\frac{36\,389}{12\,096}, -\frac{7\,087\,261}{1\,814\,400}, -\frac{3\,098\,411}{604\,800}, -\frac{1\,622\,632\,573}{239\,500\,800}\right\}$$

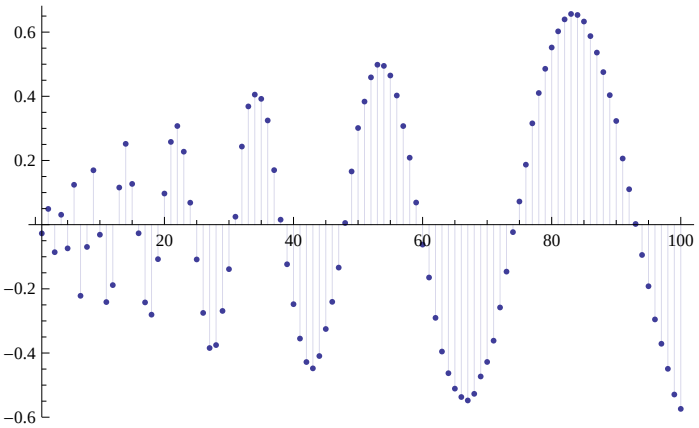
```
Table[D[eedz[2^n, -1, z] - eedz[2^n - 1, -1, z], z] /. z → 0, {n, 1, 12}]
```

$$\left\{-2, -4, -8, -\frac{52}{3}, -40, -\frac{4328}{45}, -\frac{3568}{15}, -\frac{189\,172}{315}, -\frac{291\,112}{189}, -\frac{56\,698\,088}{14\,175}, -\frac{49\,574\,576}{4725}, -\frac{12\,981\,060\,584}{467\,775}\right\}$$

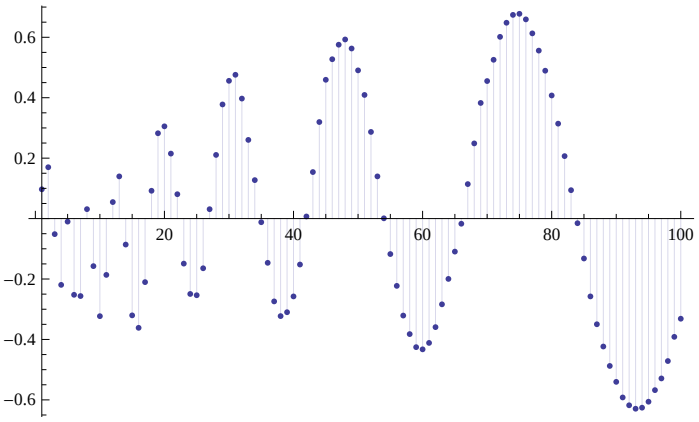
```
Table[-2^n PolyLog[-n + 1, 1 / 2] / n!, {n, 1, 12}]
```

$$\left\{-2, -4, -8, -\frac{52}{3}, -40, -\frac{4328}{45}, -\frac{3568}{15}, -\frac{189\,172}{315}, -\frac{291\,112}{189}, -\frac{56\,698\,088}{14\,175}, -\frac{49\,574\,576}{4725}, -\frac{12\,981\,060\,584}{467\,775}\right\}$$

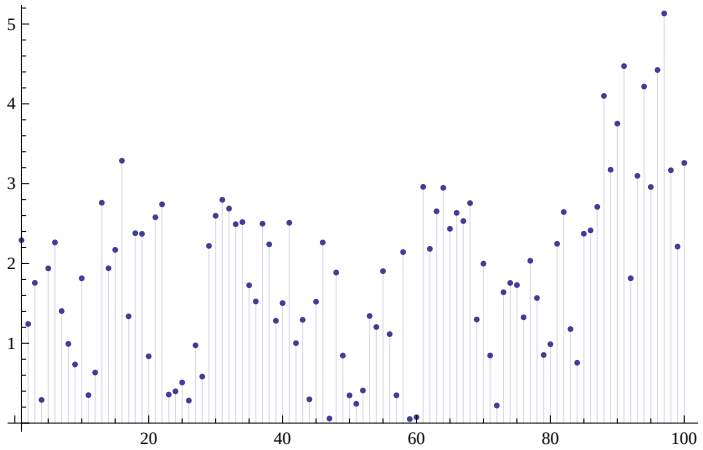
```
DiscretePlot[Re[ eedz[40 n, N[ZetaZero[1]], 1]], {n, 1, 100}]
```



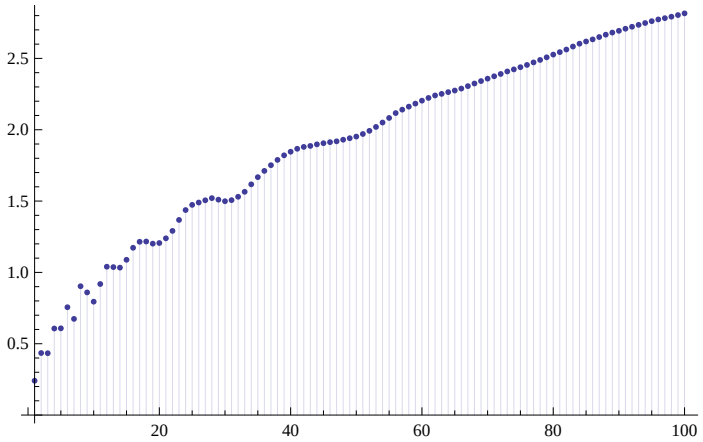

```
DiscretePlot[Im[ eedz[40 n, N[ZetaZero[1]], 1]], {n, 1, 100}]
```



```
DiscretePlot[Abs[ altz[30 n, N[ZetaZero[1]], 1]], {n, 1, 100}]
```



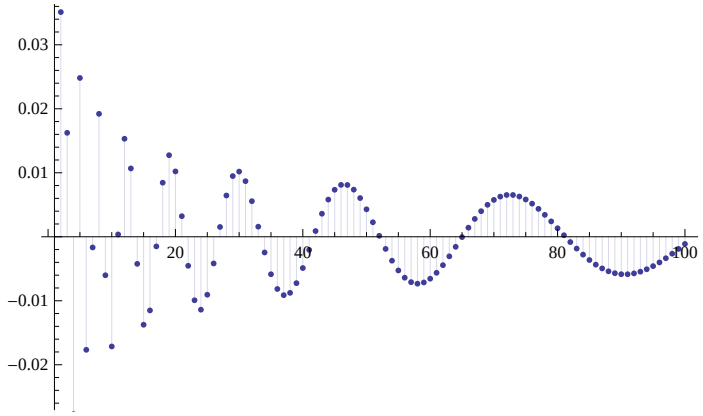

```
DiscretePlot[Abs[ dee[30 n, N[ZetaZero[1]], 1]], {n, 1, 100}]
```




```
edz[10 000, N[ZetaZero[1]], 1]
```

```
-5.10324 - 0.798884 i
```

```
DiscretePlot[Re[ eedoz[80 n, N[ZetaZero[1]], 1]], {n, 1, 100}]
```




```
N@((eedz[10 000, 0, z] + eedz[10 000, 0, -z]) / 2) /. z → I + 2 Pi I
```

```
57 548.2 + 0. i
```

```
Sum[ z^k / k ! x^(-s k), {k, 0, Infinity}]
```

$$e^{x^{-s}\,z}$$

```
N[ (e^(x^-s z) + e^(x^-s (-z))) / 2 /. x → 2 /. z → 2 I /. s → 2]
```

$$0.877583 + 0.\,i$$

```
Product[ e^(x^-2) , {x, sdf}]
```

$$e^{\text{HarmonicNumber}[sdf,2]}$$

```
Log[e^(x^-s z)]
```

$$\text{Log}\left[e^{x^{-s}\,z}\right]$$

```
N@dee[1 000 000., 1.1, 1]
```

$$6.40688$$

```
FullSimplify[Expand[(1 / (s - 1)) (n / (n + 1)^s - (n - s) / n^s)]]
```

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

```
Table[dez[n, 1], {n, 1, 100}]
```

$$\left\{1, 1, 1, \frac{1}{2}, 1, 1, 1, \frac{1}{6}, \frac{1}{2}, 1, 1, \frac{1}{2}, 1, 1, 1, \frac{1}{24}, 1, \frac{1}{2}, 1, \frac{1}{2}, 1, 1, 1, \frac{1}{6}, \frac{1}{2},\right.$$
$$1, \frac{1}{6}, \frac{1}{2}, 1, 1, 1, \frac{1}{120}, 1, 1, 1, \frac{1}{4}, 1, 1, 1, \frac{1}{6}, 1, 1, 1, \frac{1}{2}, \frac{1}{2}, 1, 1, \frac{1}{24}, \frac{1}{2}, \frac{1}{2},$$
$$1, \frac{1}{2}, 1, \frac{1}{6}, 1, \frac{1}{6}, 1, 1, 1, \frac{1}{2}, 1, 1, \frac{1}{2}, \frac{1}{720}, 1, 1, 1, \frac{1}{2}, 1, 1, 1, \frac{1}{12}, 1, 1, \frac{1}{2},$$
$$\left.\frac{1}{2}, 1, 1, 1, \frac{1}{24}, \frac{1}{24}, 1, 1, \frac{1}{2}, 1, 1, 1, \frac{1}{6}, 1, \frac{1}{2}, 1, \frac{1}{2}, 1, 1, 1, \frac{1}{120}, 1, \frac{1}{2}, \frac{1}{2}, \frac{1}{4}\right\}$$

```
PrimeQ[11]
```

True

```
is2[2]
```

```
FullSimplify[is2[32]]
```

$$\frac{32}{5}$$

```
N@D[dee[10 000, 0, z], {z, 0}]
```

$$1. + 1229.\, z + 2612.5\, z^2 + 2181.83\, z^3 + 957.167\, z^4 + 263.317\, z^5 + 45.5958\, z^6 + 5.49762\, z^7 + 0.4313\, z^8 + 0.0216049\, z^9 + 0.000857859\, z^{10} + 9.11897 \times 10^{-6}\, z^{11} + 1.64926 \times 10^{-7}\, z^{12} + 1.6059 \times 10^{-10}\, z^{13}$$

```
PrimePi[10 000]
```

1229

```
D[E^(z PrimeZetaP[s]), {z, 4}]
```

$$e^{z\,\text{PrimeZetaP}[s]}\,\text{PrimeZetaP}[s]^4$$

```
ff[z_, s_] := (E^z PrimeZetaP[s] + E^-z PrimeZetaP[s]) / 2
```

```
N@ff[2 Pi I + 2 I, 2]
```

$$-0.188201 + 0.\, i$$

```
N@(dee[10 000, 2, 2 I + 2 Pi I] + dee[10 000, 2, -2 I - 2 Pi I]) / 2
```

$$-0.827469 - 1.66533 \times 10^{-16}\, i$$

```
N@(dee[1 000 000, 2, 2 I])
```

$$0.618082 + 0.786113\, i$$

```
N@E^((I + 2 Pi I) PrimeZetaP[2])
```

$$-0.988439 - 0.151622\, i$$

```
N@Expand@deee[1 000 000, 2, z]
```

$$1. + 0.452247\, z + 0.102264\, z^2 + 0.015416\, z^3 + 0.00174283\, z^4 + 0.000157587\, z^5 + 0.0000118633\, z^6 + 7.63386 \times 10^{-7}\, z^7 + 4.26769 \times 10^{-8}\, z^8 + 2.08783 \times 10^{-9}\, z^9 + 8.90975 \times 10^{-11}\, z^{10} + 3.28881 \times 10^{-12}\, z^{11} + 1.02193 \times 10^{-13}\, z^{12} + 2.64664 \times 10^{-15}\, z^{13} + 5.2449 \times 10^{-17}\, z^{14} + 8.31974 \times 10^{-19}\, z^{15} + 9.13858 \times 10^{-21}\, z^{16} + 6.50551 \times 10^{-23}\, z^{17} + 3.11317 \times 10^{-25}\, z^{18} + 2.8245 \times 10^{-28}\, z^{19}$$

```
(deee[1 000 000, 2, I] + deee[1 000 000, 2, -I]) / 2
```

$Aborted

```
v100[z_] := 1.` + 0.4522473522653741` z + 0.10226367184134524` z^2 +
  0.015415962433582885` z^3 + 0.001742831515174532` z^4 + 0.0001575865432196950 3` z^5 +
  0.00001186327572586247 6` z^6 + 7.633863778094078`*^-7 z^7 + 4.267692925500261`*^-8 z^8 +
  2.087828092466002`*^-9 z^9 + 8.909746884969071`*^-11 z^10 + 3.288807673239177`*^-12 z^11 +
  1.0219293646832407`*^-13 z^12 + 2.6466413005396524`*^-15 z^13 +
  5.244896831849439`*^-17 z^14 + 8.319743442894546`*^-19 z^15 + 9.138584423399247`*^-21 z^16 +
  6.505508494609741`*^-23 z^17 + 3.113170534545376`*^-25 z^18 + 2.8245024763158775`*^-28 z^19
```

```
(v100[I] + v100[-I]) / 2
```

$$0.899467 + 0.\, i$$

```
(v100[I + 2 Pi I] + v100[-I - 2 Pi I]) / 2
```

$$-0.988635 + 0.\, i$$

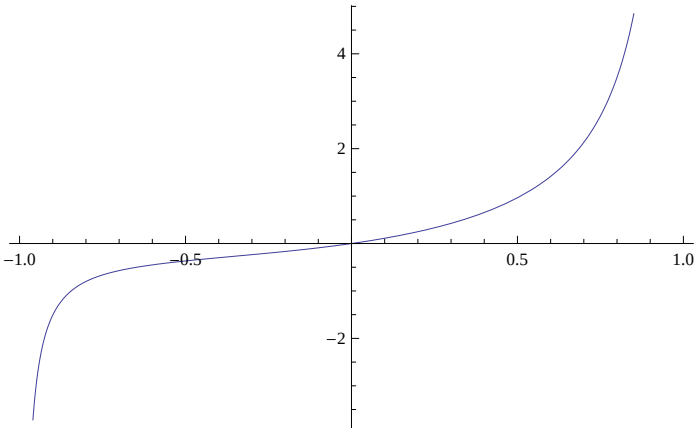
```
N[PrimeZetaP[2]]
```

0.452247

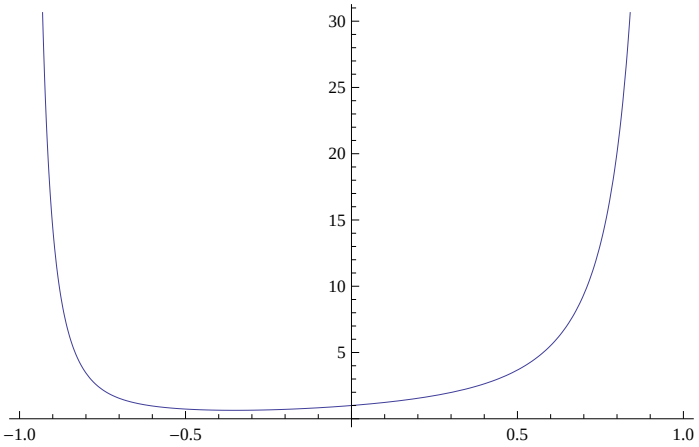
```
gf[x_, t_] := Sum[ dez[k, 1] x^k, {k, 1, t}]
```

$$\text{gf2}[x\_, t\_] := \frac{x\left(-1 + x^t\right)}{-1 + x}$$

```
Plot[gf[x, 10 000], {x, -.99, .99}]
```




```
Plot[D[gf[x, 10 000], x] /. x → y, {y, -.99, .99}]
```




```
Table[ N@D[gf[x, 10 000], x] /. x → .5^k, {k, 1, 10}]
```

```
{3.67685, 1.74605, 1.30221, 1.13729, 1.0655, 1.03199, 1.01581, 1.00786, 1.00392, 1.00196}
```

```
Table[ gf[.5^k, 10 000], {k, 1, 10}]
```

```
{0.964379, 0.331366, 0.142735, 0.066659, 0.0322576,
 0.015873, 0.00787401, 0.00392157, 0.00195695, 0.000977517}
```

```
Sum[ x^k, {k, 1, t}]
```

$$\frac{x\left(-1+x^{t}\right)}{-1+x}$$

```
rootsa[1 000 000, 2]
```

```
{-877.729, -71.1618, -37.3299 - 96.7985 i, -37.3299 + 96.7985 i,
 -11.2549, -10.813 - 4.36228 i, -10.813 + 4.36228 i, -9.53977 - 8.79402 i,
 -9.53977 + 8.79402 i, -8.22574 - 43.3573 i, -8.22574 + 43.3573 i,
 -7.71922 - 13.0623 i, -7.71922 + 13.0623 i, -4.11337 - 16.6111 i, -4.11337 + 16.6111 i,
 -1.44157 - 19.9597 i, -1.44157 + 19.9597 i, 8.15454 - 17.9539 i, 8.15454 + 17.9539 i}
```

```
deee[1000, 2, z]
```

$$1. + 0.45212\, z + 0.101999\, z^2 + 0.0151986\, z^3 + 0.00165117\, z^4 + 0.000133422\, z^5 + 7.92725 \times 10^{-6}\, z^6 + 2.84793 \times 10^{-7}\, z^7 + 7.91626 \times 10^{-9}\, z^8 + 5.25614 \times 10^{-11}\, z^9$$

```
deee[1000, 1, z]
```

$$1. + 2.19808\, z + 1.81743\, z^2 + 0.769749\, z^3 + 0.191547\, z^4 + 0.0288456\, z^5 + 0.00280736\, z^6 + 0.000129318\, z^7 + 5.40495 \times 10^{-6}\, z^8 + 3.7676 \times 10^{-8}\, z^9$$

```
deee[1000, 0, z]
```

$$1. + 168\, z + 293.5\, z^2 + 189.667\, z^3 + 64.7083\, z^4 + 12.225\, z^5 + 1.48333\, z^6 + 0.0710317\, z^7 + 0.00409226\, z^8 + 0.0000275573\, z^9$$

```
deee[1000, -1, z]
```

$$1. + 76\,127.\, z + 144\,479.\, z^2 + 99\,082.3\, z^3 + 36\,544.8\, z^4 + 7368.42\, z^5 + 979.729\, z^6 + 44.1754\, z^7 + 3.32063\, z^8 + 0.0204586\, z^9$$

```
E^(p^1 z) / E^(p^2 z)
```

$$e^{p\, z - p^2\, z}$$

```
pz[s_, t_] := Product[ Zeta[k s]^(MoebiusMu[k] / k), {k, 1, t}]
```

```
Table[ N@pz[-3.17 + I, 2^k], {k, 1, 8}]
```

Power::indet : Indeterminate expression $(0. + 0.\,i)^0$ encountered. ≫

$$\{0.0123534 + 0.0873678\, i,\ 0.104733 + 0.0711296\, i,\ 0.0202845 - 0.00777074\, i,\ 2.1727 - 0.765559\, i,\ 9.541 \times 10^{-9} - 4.45087 \times 10^{-9}\, i,\ 106.345 - 101.955\, i,\ 0.0128624 - 0.0138756\, i,\ \text{Indeterminate}\}$$

```
Table[ Zeta[k (-3.17 + I)]^(MoebiusMu[k] / k), {k, 200, 200}] // TableForm
```

Power::indet : Indeterminate expression $(0. + 0.\,i)^0$ encountered. ≫

Indeterminate

```
Expand[E^(a^b)]
```

```
2^-2
```

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

```
Table[deee[n, 0, 1] / n, {n, 1000, 100 000, 1000}]
```

```
{0.730658, 0.730059, 0.729808, 0.729799, 0.729808, 0.729516, 0.729492, 0.729547, 0.729519,
 0.729636, 0.729457, 0.729394, 0.729465, 0.729433, 0.729482, 0.729436, 0.72952,
 0.729457, 0.729452, 0.72944, 0.729441, 0.729472, 0.72939, 0.729468, 0.729368, 0.729434,
 0.729311, 0.729377, 0.729346, 0.729398, 0.729415, 0.729333, 0.72932, 0.729401,
 0.729363, 0.729359, 0.729358, 0.729299, 0.729297, 0.729303, 0.729322, 0.729321,
 0.729378, 0.72941, 0.729384, 0.729389, 0.729425, 0.729437, 0.729396, 0.72936, 0.729382,
 0.729385, 0.729369, 0.729335, 0.72936, 0.729341, 0.729336, 0.729337, 0.729303,
 0.729318, 0.729376, 0.729376, 0.729354, 0.729338, 0.729333, 0.72934, 0.729334,
 0.729363, 0.729316, 0.729339, 0.729346, 0.729352, 0.729346, 0.729309, 0.729313,
 0.729292, 0.729298, 0.729315, 0.729321, 0.729291, 0.72929, 0.729264, 0.729299,
 0.729295, 0.72931, 0.729302, 0.729304, 0.729322, 0.729342, 0.729313, 0.729312,
 0.729328, 0.729348, 0.729348, 0.72934, 0.729331, 0.729323, 0.729318, 0.729303, 0.72931}
```

```
N[dee[1 000 000, 0, 1] / 1 000 000]
```

```
0.729276
```

```
N[deee[10 000 000, 0, 1] / 10 000 000]
```

```
0.729268
```

```
N[deee[100 000 000, 0, 1] / 100 000 000]
```

```
0.729266
```

```
Integrate[ E^(x), x]
```

$$e^x$$

```
D[E^x, x]
```

$$e^x$$

```
Table[dez[n, z], {n, 1, 40}]
```

$$\left\{1, z, z, \frac{z^2}{2}, z, z^2, z, \frac{z^3}{6}, \frac{z^2}{2}, z^2, z, \frac{z^3}{2}, z, z^2, z^2, \frac{z^4}{24}, z, \frac{z^3}{2}, z, \frac{z^3}{2},\right.$$
$$\left. z^2, z^2, z, \frac{z^4}{6}, \frac{z^2}{2}, z^2, \frac{z^3}{6}, \frac{z^3}{2}, z, z^3, z, \frac{z^5}{120}, z^2, z^2, z^2, \frac{z^4}{4}, z, z^2, z^2, \frac{z^4}{6}\right\}$$

```
dee[100, 0, z]
```

$$1 + 25\,z + 32\,z^2 + \frac{77\,z^3}{6} + \frac{35\,z^4}{12} + \frac{7\,z^5}{40} + \frac{7\,z^6}{720}$$

```
Expand@Sum[ dez[j, 1] dee[100 / j, 0, z - 1], {j, 1, 100}]
```

$$1 + 25\,z + 32\,z^2 + \frac{77\,z^3}{6} + \frac{35\,z^4}{12} + \frac{7\,z^5}{40} + \frac{7\,z^6}{720}$$

```
Expand@Sum[ dez[j, 1] dez[k, z - 1], {j, 1, 100}, {k, 1, 100 / j}]
```

$$1 + 25\,z + 32\,z^2 + \frac{77\,z^3}{6} + \frac{35\,z^4}{12} + \frac{7\,z^5}{40} + \frac{7\,z^6}{720}$$