```
Series[Log[1 - x], {x, 0, 20}]
```

$$-x-\frac{x^2}{2}-\frac{x^3}{3}-\frac{x^4}{4}-\frac{x^5}{5}-\frac{x^6}{6}-\frac{x^7}{7}-\frac{x^8}{8}-\frac{x^9}{9}-\frac{x^{10}}{10}-\frac{x^{11}}{11}-\frac{x^{12}}{12}-\frac{x^{13}}{13}-\frac{x^{14}}{14}-\frac{x^{15}}{15}-\frac{x^{16}}{16}-\frac{x^{17}}{17}-\frac{x^{18}}{18}-\frac{x^{19}}{19}-\frac{x^{20}}{20}+O[x]^{21}$$

```
zz := {-29.407537413505008`, -1.1021582827960137`, -0.05342140922542308`,
  -2.635108113903445` - 2.146393318275011` i, -2.635108113903445` + 2.146393318275011` i}
```

```
Sum[ -1 / zz[[j]], {j, 1, 5}]
```

```
20.1167 + 0. i
```

```
Sum[ -1 / j, {j, zz}]
```

```
20.1167 + 0. i
```

```
K[n_] := If[n == 1, 0, FullSimplify[MangoldtLambda[n] / Log[n]]]
P[n_, k_] := P[n, k] = Sum[ K[j] P[Floor[n / j], k - 1], {j, 2, n}]; P[n_, 0] := 1
```

```
Sum[ -(1 / j)^2 / 2, {j, zz}]
```

```
-175.632 + 0. i
```

```
N[P[60, 1]]
```

```
20.1167
```

```
Product[ 1 - 1 / j, {j, zz}]
```

```
60. + 0. i
```

```
N[Log[60]]
```

```
4.09434
```

```
Sum[Log[ 1 - 1 / j], {j, zz}]
```

```
4.09434 + 0. i
```

```
Sum[-Sum[(1 / j)^k / k, {k, 1, Infinity}] , {j, zz}]
```

```
Sum::div : Sum does not converge. >>
```

```
Sum::div : Sum does not converge. >>
```

$$(1.11276 + 0.\,i) - \sum_{k=1}^{\infty} \frac{(-18.7191)^k}{k}$$

```
-Sum[((1 / -29.407537413505008`))^k / k, {k, 1, Infinity}]
```

```
0.0334395
```

```
Log[1 - 1 / -29.407537413505008`]
```

```
0.0334395
```

```
-Sum[((-29.407537413505008`))^-k / k, {k, 1, Infinity}]
```

```
0.0334395
```

```
Product[ 1 + 1 / j, {j, zz}]
```

```
-1. + 0. i
```

```
Table[1 - 1 / j, {j, zz}]
```

```
{1.034, 1.90731, 19.7191, 1.22813 - 0.185822 i, 1.22813 + 0.185822 i}
```

```
Table[1 + 1 / j, {j, zz}]
```

```
{0.965995, 0.0926893, -17.7191, 0.771868 + 0.185822 i, 0.771868 - 0.185822 i}
```

```
Table[{j, Log[1 - 1 / j]}, {j, zz}] // TableForm
```

```
-29.4075              0.0334395
-1.10216              0.645694
-0.0534214            2.98159
-2.63511 - 2.14639 i  0.216812 - 0.150166 i
-2.63511 + 2.14639 i  0.216812 + 0.150166 i
```

```
rr := {-538.7280710130938` - 31.094905998204375` - 83.46099633089887` i,
  -31.094905998204375` + 83.46099633089887` i - 15.721149480285847`,
  -13.486413504783055` - 22.10351145173496` i - 13.486413504783055` + 22.10351145173496` i,
  -7.9760735935696205` - 11.94140501519714` i - 7.9760735935696205` + 11.94140501519714` i,
  -3.619023369385454` - 5.171534060215738` i - 3.619023369385454` + 5.171534060215738` i,
  -2.5845711900455886` - 2.2734117940346312` i - 2.5845711900455886` + 2.2734117940346312` i,
  -1.6589500907060373` - 0.7384251179668456` i - 1.6589500907060373` + 0.7384251179668456` i,
  -0.9461081601869141` - 0.00008997069219036382`}
```

```
Product[(1 - 1 / j), {j, rr}]
```

```
117 337. - 1.8951 × 10^-13 i
```

```
-Sum[1 / j, {j, rr}]
```

```
11 117.6 + 0. i
```

```
N[Log[117 337]]
```

```
11.6728
```

```
Sum[Log[1 - 1 / j], {j, rr}]
```

```
11.6728 + 0. i
```

```
Limit[(117 337^z - 1.) / z, z → 0]
```

```
11.6728
```

```
Limit[Sum[((1 - j^-1)^z - 1) / z, {j, rr}], z → 0]
```

```
11.6728 + 0. i
```

```
Sum[Log[1 - 1 / rr[[j]]], {j, 1, Length[rr]}]
```

```
11.6728 + 0. i
```

```
Sum[Log[1 - 1 / rr[[j]]], {j, 1, Length[rr]}]
```

```
Sum[-Sum[(1 / rr[[j]])^k / k, {k, 1, Infinity}] , {j, Length[rr]}]
```

Sum::div : Sum does not converge. ≫

Sum::div : Sum does not converge. ≫

Sum::div : Sum does not converge. ≫

General::stop : Further output of Sum::div will be suppressed during this calculation. ≫

$$(1.63546 + 0.\,i) - \sum_{k=1}^{\infty} \frac{(-11114.7)^k}{k} - \sum_{k=1}^{\infty} \frac{(-1.05696)^k}{k}$$