```
dd[n_, z_] := (-1)^z ((1 - Gamma[ z, -Log[n]]) / Gamma[z])
```

```
dd[100]
```

```
dd[100, 2.]
```

$361.517 - 1.32697 \times 10^{-13}\, i$

```
dd[100, 0]
```

0

```
FullSimplify[D[dd[100, z], z]]
```

$$\frac{1}{\text{Gamma}[z]}\ (-1)^z\ (i\,\pi - \text{MeijerG}[\{\{\}, \{1, 1\}\}, \{\{0, 0, z\}, \{\}\}, -2\,\text{Log}[10]] - \text{PolyGamma}[0, z] + \text{Gamma}[z, -2\,\text{Log}[10]]\ (-2\,i\,\pi - \text{Log}[\text{Log}[100]] + \text{PolyGamma}[0, z]))$$

```
1/Gamma[z] (-1)^z (i π - MeijerG[{{}, {1, 1}}, {{0, 0, z}, {}}, -2 Log[10]] - PolyGamma[0, z] +
    Gamma[z, -2 Log[10]] (-2 i π - Log[Log[100]] + PolyGamma[0, z])) /. z → 0
```

Infinity::indet : Indeterminate expression
$i\pi$ + ComplexInfinity + ComplexInfinity − MeijerG[{{}, {1, 1}}, {{0, 0, 0}, {}}, −2 Log[10]] encountered. ≫

Indeterminate

```
dd[100, .5]
```

$-1.73281 - 0.576858\, i$

```
ddd[n_, z_, d_] := (dd[n, z + d] - dd[n, z - d]) / (2 d)
```

```
ddd[100, 0, .000001]
```

$31.1261 + 3.14159\, i$

```
LogIntegral[100.]
```

30.1261

```
-Gamma[0, -Log[100.]]
```

$30.1261 + 3.14159\, i$

```
eee[100, 3, 2]
```

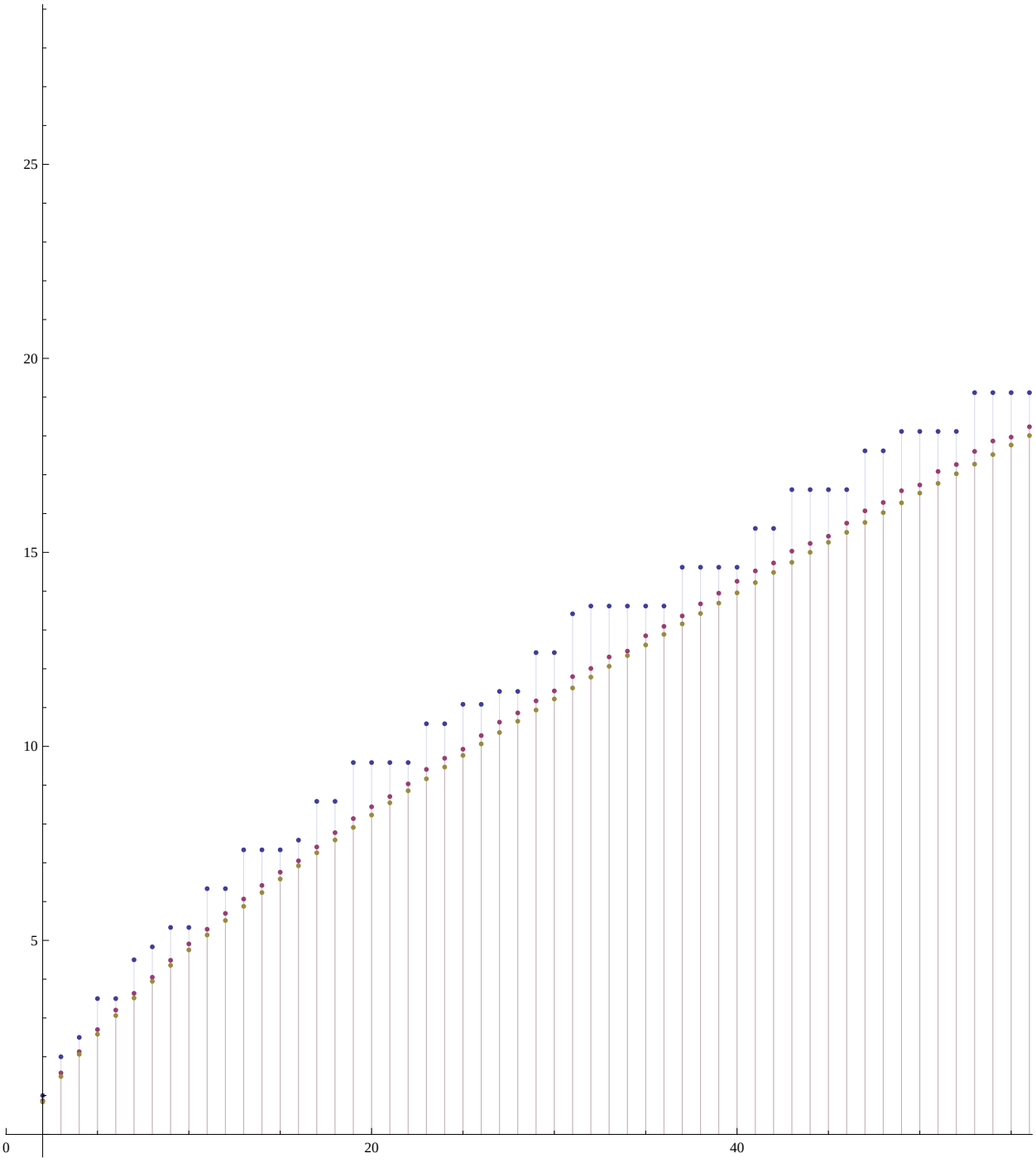
71

```
eee[n_, k_, c_] := eee[n, k, c] = Sum[ eee[Floor[n / j], k - 1, c], {j, c + 1, n}] / c;
eee[n_, 0, c_] := eee[n, 0, c] = 1
Dd[n_, 0, a_] := Dd[n, 0, a] = 1; Dd[n_, 1, a_] := Dd[n, 1, a] = Floor[n] - a + 1
Dd[n_, k_, a_] := Dd[n, k, a] =
  Sum[Binomial[k, j] Dd[Floor[n / (m^(k - j))], j, m + 1], {m, a, n^(1 / k)}, {j, 0, k - 1}]
ef[n_, k_, c_] := eee[ n c^k, k, c]
df[n_, k_, c_] := If[ n c^k < (c + 1)^k, 0, Dd[ n c^k, k, c + 1] / c^k]
pf[n_, c_] := Sum[ (-1)^(k + 1) / k df[ n, k, c], {k, 1, 100}]
bin[z_, k_] := Product[z - j, {j, 0, k - 1}] / k!
bf[n_, z_, c_] := Expand[Sum[ bin[z, k] df[ n, k, c], {k, 1, 100}]]
zeros[n_, c_] := List @@ NRoots[ bf[n, z, c] == 0, z][[All, 2]]
lp[n_, c_] := RootLocusPlot[1 / bf[n, z, c], {k, 0, 1}]
```

```
df[100, 50, 20]
```

26 128 734 561 791 570 755 717 594 093 /
112 589 990 684 262 400 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000

```
DiscretePlot[{pf[n, 1], pf[n, 6], LogIntegral[n] - Log[Log[n]] - EulerGamma}, {n, 2, 100}]
```




```
bf[10, z, 20]
```

```
LogIntegral[10.] - Log[Log[10.]] - EulerGamma
```

```
4.75435
```