```
E2a[n_, k_, a_] :=
 E2a[n, k, a] = Sum[ E2a[n / j, k - 1, a], {j, 2, n}] - a Sum[ E2a[n / (a j), k - 1, a], {j, 1, n / a}];
E2a[n_, 0, a_] := 1
E1b[n_, k_, b_] := Sum[ Binomial[k, j] E2a[n, k - j, b], {j, 0, k}]
E1b[n_, z_, b_] := Expand[Sum[bins[z, a] E2a[n, a, b], {a, 0, Log[If[ b < 2, b, 2], n]}]]
E1c[n_, z_, b_] := Expand[FullSimplify[(E1b[n, z + 1, b] - 1) / (z + 1)]]
```

```
E1b[100, z, 3 / 2]
```

$$1-\frac{8\,149\,753\,z}{2\,365\,440}+\frac{44\,308\,889\,z^2}{6\,451\,200}-\frac{3\,885\,851\,z^3}{1\,075\,200}-\frac{47\,910\,697\,z^4}{41\,287\,680}+\frac{32\,326\,801\,z^5}{13\,762\,560}-$$
$$\frac{159\,089\,057\,z^6}{117\,964\,800}+\frac{110\,725\,357\,z^7}{275\,251\,200}-\frac{490\,059\,z^8}{9\,175\,040}+\frac{21\,519\,z^9}{9\,175\,040}+\frac{2673\,z^{10}}{91\,750\,400}-\frac{2187\,z^{11}}{1\,009\,254\,400}$$

```
E1c[100, z, 3 / 2]
```

$$\frac{823\,345\,z}{946\,176}-\frac{856\,706\,161\,z^2}{567\,705\,600}+\frac{343\,389\,241\,z^3}{324\,403\,200}-\frac{70\,576\,831\,z^4}{1\,135\,411\,200}+\frac{706\,832\,933\,z^5}{9\,083\,289\,600}+$$
$$\frac{290\,809\,943\,z^6}{3\,027\,763\,200}-\frac{17\,086\,851\,z^7}{504\,627\,200}+\frac{1\,266\,651\,z^8}{504\,627\,200}+\frac{7533\,z^9}{1\,009\,254\,400}-\frac{2187\,z^{10}}{1\,009\,254\,400}$$

```
bins[ z_, a_] := Product[ (z - k), {k, 0, a - 1}] / a!
D2a[n_, k_] := D2a[n, k] = Sum[D2a[Floor[n / j], k - 1], {j, 2, n}]; D2a[n_, 0] := 1
D1a[n_, k_] := Sum[ bins[k, j] D2a[n, k - j], {j, 0, k}]
D1a[n_, z_] := Expand[Sum[bins[z, a] D2a[n, a], {a, 0, Log[2, n]}]]
D1c[n_, z_] := Expand[FullSimplify[(D1a[n, z + 1] - 1) / (z + 1)]]
```

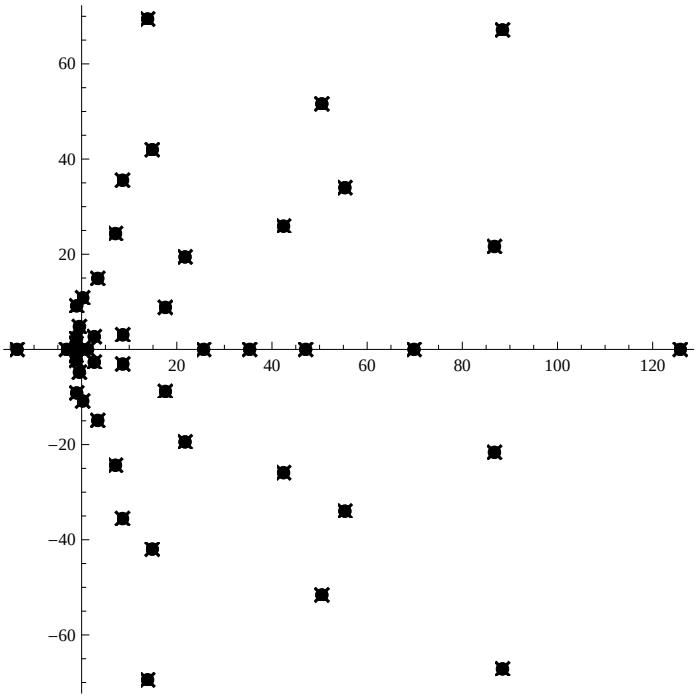
```
D1a[100, x]
```

$$1+\frac{428\,x}{15}+\frac{16\,289\,x^2}{360}+\frac{331\,x^3}{16}+\frac{611\,x^4}{144}+\frac{67\,x^5}{240}+\frac{7\,x^6}{720}$$

```
D1c[100, x]
```

$$99+\frac{6031\,x}{60}+\frac{3167\,x^2}{90}+\frac{3929\,x^3}{720}+\frac{59\,x^4}{180}+\frac{7\,x^5}{720}$$

```
RootLocusPlot[1 / Expand[E1c[100, x, 11 / 10]], {k, 0, 1}, FeedbackType → None]
```




```
RootLocusPlot[1 / Expand[E1b[100, x, 11 / 10]], {k, 0, 1}, FeedbackType → None]
```