

```

d1[n_, z_] := Product[(-1)^p[[2]] Binomial[-z, p[[2]]], {p, FI[n]};
FI[n_] := FactorInteger[n]; FI[1] := {}
ReferenceD1[n_, z_] := Sum[d1[j, z], {j, 1, n}]
num[c_] := Numerator[c]; den[c_] := Denominator[c]
alpha[n_, c_] := den[c] (Floor[n / den[c]] - Floor[(n - 1) / den[c]]) -
  num[c] (Floor[n / num[c]] - Floor[(n - 1) / num[c]])
E2[n_, k_, c_] := E2[n, k, c] = (1 / den[c]) Sum[If[alpha[j, c] == 0, 0,
  alpha[j, c] E2[(den[c] n) / j, k - 1, c]], {j, den[c] + 1, den[c] n}]; E2[n_, 0, c_] := 1
L2[n_, 0] := 0; L2[n_, 1] := Sum[Log[j], {j, 2, n}]
L2[n_, k_] := Sum[L2[n / j, k - 1], {j, 2, n}]
L1[n_, z_] := Sum[Binomial[z, k] L2[n, k], {k, 0, Log[2, n]}]
L2[n_, k_, c_] := L2[n, k, c] =
  (1 / den[c]) Sum[If[alpha[j, c] == 0, 0, alpha[j, c] Log[j / den[c]] E2[den[c] n / j, k - 1, c]],
  {j, den[c] + 1, den[c] n}]; L2[n_, 0, c_] := 0
bin[z_, k_] := Product[z - j, {j, 0, k - 1}] / k!
L1[n_, z_, c_] :=
  L1[n, z, c] = Sum[bin[z, k] L2[n, k, c], {k, 1, Floor[Log[If[c < 2, c, 2], n]]}]

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N[L1[100, 1, 2]]

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-2.53088

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N[L1[100, 1]]

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363.739

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