```
num[c_] := Numerator[c]; den[c_] := Denominator[c]
alpha[n_, 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]])
Lm1[n_, c_] := (1 / den[c]) Sum[If[alpha[j, c] == 0, 0,
     alpha[j, c] (Log[j / den[c]] - Lm1[den[c] n / j, c])], {j, den[c] + 1, den[c] n}]
Em1[n_, c_] := 1 - (1 / den[c]) Sum[If[alpha[j, c] == 0, 0, alpha[j, c] (Em1[den[c] n / j, c])],
     {j, den[c] + 1, den[c] n}]
E1mAlt[n_, c_] := den[c]^-1 Sum[Em1[n den[c] / j, c] N[alpha[j, c]], {j, 1, n den[c]}]
L1mT[n_, c_] := den[c]^-1 Sum[Lm1[n den[c] / j, c] alpha[j, c], {j, 1, n den[c]}]
```

```
E1mAlt[100, 1.3]
```

```
1.
```

```
L1mT[100, 2]
```

```
-2.53088
```

```
L2x[n_, 1, b_] := L2x[n, 1, b] = Sum[Log[j], {j, 2, n}] - b Sum[Log[j b], {j, 1, n / b}]
L2x[n_, k_, b_] := Sum[L2x[n / j, k - 1, b], {j, 2, n}] - b Sum[L2x[n / (j b), k - 1, b], {j, 1, n}]
L1[n_, z_, x_] :=
 L1[n, z, x] = Sum[Binomial[z, k] L2x[n, k, x], {k, 1, Floor[Log[If[x < 2, x, 2], n]]}]
```

```
N[FullSimplify[L1x[100, 1, 3]]]
```

```
-0.186642
```

```
N[FullSimplify[L1mT[100, 3]]]
```

```
-0.186642
```

```
ch[n_] := Sum[ MangoldtLambda[ j ], {j, 1, n}]
```

```
N[Sum[ ch[100 / j], {j, 1, 100}]]
```

```
363.739
```

```
N[L1[ 200, -1, 2.5]]
```

```
-58.5371
```

```
E2x[n_, k_, x_] :=
 E2x[n, k, x] = Sum[E2x[n / j, k - 1, x], {j, 2, n}] - x Sum[E2x[n / (x j), k - 1, x], {j, 1, n / x}];
E2x[n_, 0, x_] := 1
E1x[n_, z_, c_] := Sum[Binomial[z, k] E2x[n, k, c], {k, 0, Floor[Log[If[c < 2, c, 2], n]]}]
L1mAltx[ n_, x_] := -(Sum[ Log[j] E1x[ n / j, -1, x], {j, 2, n}] -
     x Sum[ Log[j x ] E1x[ n / (j x), -1, x], {j, 1, Floor[n / x]}])
L1mAltx2[ n_, x_] := -Log[n] E1x[1, -1, x] - (Sum[ Log[j] E1x[ n / j, -1, x], {j, 2, n - 1}] -
     x Sum[ Log[j x ] E1x[ n / (j x), -1, x], {j, 1, n - 1}])
L1mAltx3[ n_, x_] := -Log[n] E1x[1, -1, x] + x Log[x] E1x[n / x, -1, x] -
   (Sum[ Log[j] E1x[ n / j, -1, x], {j, 2, n - 1}] -
     x Sum[ Log[j x ] E1x[ n / (j x), -1, x], {j, 2, n - 1}])
```

```
N[L1mAltx[ 200, 2.5]]
```

```
-58.5371
```

```
E1x[ 1, -1, 1.01]
```

```
1
```

```
N[L1mAltx[ 10, 1.03]]
```

```
1.03569
```

```
N[L1mAltx3[ 10, 1.03]]
```

```
1.03569
```

```
1.01 Log[1.01] E1x[10 / 1.01, -1, 1.01]
```

```
$RecursionLimit::reclim : Recursion depth of 256 exceeded. ≫
```

```
$RecursionLimit::reclim : Recursion depth of 256 exceeded. ≫
```

```
$RecursionLimit::reclim : Recursion depth of 256 exceeded. ≫
```

```
General::stop : Further output of $RecursionLimit::reclim will be suppressed during this calculation. ≫
```

```
$Aborted
```