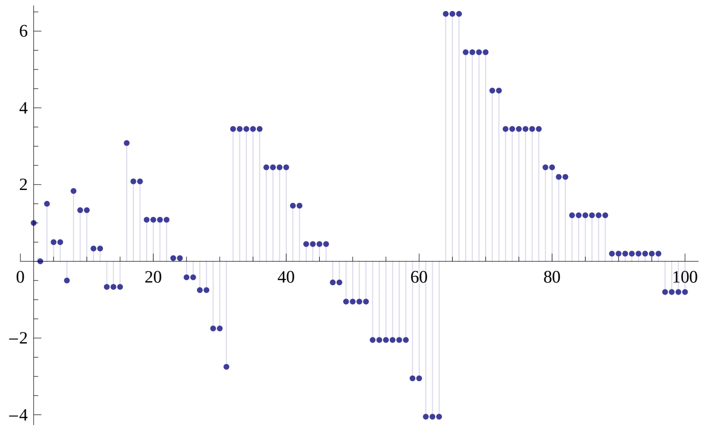
```
E2[n_, k_] := Sum[(-1)^j E2[n / j, k - 1], {j, 2, n}]; E2[n_, 0] := 1
P2[ n_] := Sum[ k^-1 E2[ n, k], {k, 1, Log[2, n]}]
DiscretePlot[ P2[n], {n, 2, 100}]
```




```
E2[1000, 5]
```

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```
eee[n_, 0, a_] := 1
eee[n_, k_, a_] :=
 If[n < a^k, 0, Sum[Binomial[k, j] ((-1)^(a + 1))^j eee[n / a^j, k - j, a + 1], {j, 0, k}]]
eee[1000, 5, 2]
```

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```
ee3[n_, 0, a_] := 1
ee3[n_, k_, a_] := Sum[Binomial[k, j] ((-1)^m)^j ee3[n / ((m)^j), k - j, m],
  {j, 1, k}, {m, a + 1, Floor[n^(1 / k)]}]
ee3[
 10000,
 5,
 1]
```

-1139

```
ee4[n_, 0, a_] := 1
```

$$\texttt{ee4[n\_, 1, a\_] :=} -\frac{1}{2}(-1)^{a} + \frac{1}{2}(-1)^{\texttt{Floor[n]}}$$

```
ee4[n_, k_, a_] := Sum[((-1)^m)^k , {m, a + 1, Floor[n^(1 / k)]}] +
  Sum[Binomial[k, j] ((-1)^m)^j ee4[n / (m^j), k - j, m],
   {m, a + 1, Floor[n^(1 / k)]}, {j, 1, k - 1}]
ee4[
 1000,
 5,
 1]
```

-190

```
ee5[n_, 0, a_] := 1
ee5[n_, 1, a_] := -1/2 (-1)^a + 1/2 (-1)^Floor[n]
ee5[n_, k_, a_] := Sum[((-1)^m)^k , {m, a + 1, Floor[n^(1/k)]}] +
  Sum[k ((-1)^m)^(k - 1) ee5[n/(m^(k - 1)), 1, m], {m, a + 1, Floor[n^(1/k)]}] +
  Sum[Binomial[k, j] ((-1)^m)^j ee5[n/(m^j), k - j, m],
   {m, a + 1, Floor[n^(1/k)]}, {j, 1, k - 2}]
ee5[
 10000,
 5,
 1]
```

-1139

```
ee6[n_, 0, a_] := 1
ee6[n_, 1, a_] := -1/2 (-1)^a + 1/2 (-1)^Floor[n]
ee6[n_, 2 _, a_] := Sum[((-1)^m)^2 , {m, a + 1, Floor[n^(1/2)]}] +
  2 Sum[ ((-1)^m)^(2 - 1) (-1/2 (-1)^m + 1/2 (-1)^Floor[n/(m^(2-1))]), {m, a + 1, Floor[n^(1/2)]}]
ee6[n_, k_, a_] := Sum[((-1)^m)^k , {m, a + 1, Floor[n^(1/k)]}] +
  k Sum[ ((-1)^m)^(k - 1) (-1/2 (-1)^m + 1/2 (-1)^Floor[n/(m^(k-1))]), {m, a + 1, Floor[n^(1/k)]}] +
  Sum[Binomial[k, j] ((-1)^m)^j ee6[n/(m^j), k - j, m],
   {m, a + 1, Floor[n^(1/k)]}, {j, 1, k - 2}]
ee6[
 10000,
 5,
 1]
```

-1139

```
Sum[((-1)^m)^k , {m, a + 1, Floor[n^(1/k)]}] +
 k Sum[ ((-1)^m)^(k - 1) (-1/2 (-1)^m + 1/2 (-1)^Floor[n/(m^(k-1))]), {m, a + 1, Floor[n^(1/k)]}]
```

$Aborted

```
ee7[n_, 0, a_] := 1
ee7[n_, 1, a_] := -1/2 (-1)^a + 1/2 (-1)^Floor[n]
ee7[n_, 2, a_] := Sum[((-1)^m)^2 , {m, a + 1, Floor[n^(1/2)]}] +
  2 Sum[ ((-1)^m)^(2 - 1) (-1/2 (-1)^m + 1/2 (-1)^Floor[n/(m^(2-1))]), {m, a + 1, Floor[n^(1/2)]}]
ee7[n_, k_, a_] := Sum[((-1)^m)^k , {m, a + 1, Floor[n^(1/k)]}] +
  k Sum[ ((-1)^m)^(k - 1) (-1/2 (-1)^m + 1/2 (-1)^Floor[n/(m^(k-1))]), {m, a + 1, Floor[n^(1/k)]}] +
  Sum[Binomial[k, j] ((-1)^m)^j ee7[n/(m^j), k - j, m],
   {m, a + 1, Floor[n^(1/k)]}, {j, 1, k - 2}]
ee7[
 10000,
 5,
 1]
```

-1139

Sum[((-1)^m)^2 , {m, a+1, Floor[n^(1/2)]}] +
2 Sum[((-1)^m) $\left(-\frac{1}{2}(-1)^m + \frac{1}{2}(-1)^{\text{Floor}[n/(m\verb|^|(2-1))]}\right)$, {m, a+1, Floor[n^(1/2)]}]

$Aborted

Sum[((-1)^m)^2 , {m, a+1, Floor[n^(1/2)]}]

$$(-1)^{2\,\text{Floor}\left[\sqrt{n}\right]}\left(-a + \text{Floor}\left[\sqrt{n}\right]\right)$$

2 Sum[((-1)^m) $\left(-\frac{1}{2}(-1)^m + \frac{1}{2}(-1)^{\text{Floor}[n/m]}\right)$, {m, a+1, Floor[n^(1/2)]}]

Expand[((-1)^m) $\left(-\frac{1}{2}(-1)^m + \frac{1}{2}(-1)^{\text{Floor}[n/m]}\right)$]

$$-\frac{1}{2}(-1)^{2m} + \frac{1}{2}(-1)^{m+\text{Floor}\left[\frac{n}{m}\right]}$$

2 Sum[$-\frac{1}{2}(-1)^{2m} + \frac{1}{2}(-1)^{m+\text{Floor}\left[\frac{n}{m}\right]}$, {m, a+1, Floor[n^(1/2)]}]

$$2\sum_{m=1+a}^{\text{Floor}\left[\sqrt{n}\right]}\left(-\frac{1}{2}(-1)^{2m} + \frac{1}{2}(-1)^{m+\text{Floor}\left[\frac{n}{m}\right]}\right)$$

2 Sum[$-\frac{1}{2}(-1)^{2m}$, {m, a+1, Floor[n^(1/2)]}]

2 Sum[$\frac{1}{2}(-1)^{m+\text{Floor}\left[\frac{n}{m}\right]}$, {m, a+1, Floor[n^(1/2)]}]

$$(-1)^{2\,\text{Floor}\left[\sqrt{n}\right]}\left(a - \text{Floor}\left[\sqrt{n}\right]\right)$$

$$2\sum_{m=1+a}^{\text{Floor}\left[\sqrt{n}\right]}\frac{1}{2}(-1)^{m+\text{Floor}\left[\frac{n}{m}\right]}$$

FullSimplify[

$$(-1)^{2\,\text{Floor}\left[\sqrt{n}\right]}\left(-a + \text{Floor}\left[\sqrt{n}\right]\right) + (-1)^{2\,\text{Floor}\left[\sqrt{n}\right]}\left(a - \text{Floor}\left[\sqrt{n}\right]\right) + 2\sum_{m=1+a}^{\text{Floor}\left[\sqrt{n}\right]}\frac{1}{2}(-1)^{m+\text{Floor}\left[\frac{n}{m}\right]}]$$

$$2\sum_{m=1+a}^{\text{Floor}\left[\sqrt{n}\right]}\frac{1}{2}(-1)^{m+\text{Floor}\left[\frac{n}{m}\right]}$$

```
ee8[n_, 0, a_] := 1
ee8[n_, 1, a_] := -1/2 (-1)^a + 1/2 (-1)^Floor[n]
ee8[n_, 2, a_] := Sum[(-1)^(m + Floor[n/m]), {m, 1 + a, Floor[Sqrt[n]]}]
ee8[n_, k_, a_] := Sum[((-1)^m)^k , {m, a + 1, Floor[n^(1/k)]}] +
  k Sum[ ((-1)^m)^(k - 1) (-1/2 (-1)^m + 1/2 (-1)^Floor[n/(m^(k-1))]), {m, a + 1, Floor[n^(1/k)]}] +
  Sum[Binomial[k, j] ((-1)^m)^j ee8[n/(m^j), k - j, m],
   {m, a + 1, Floor[n^(1/k)]}, {j, 1, k - 2}]
ee8[
 10000,
 5,
 1]
```

-1139

```
ee9[n_, 0, a_] := 1
ee9[n_, 1, a_] := -1/2 (-1)^a + 1/2 (-1)^Floor[n]
ee9[n2_, 2, a2_] := Sum[(-1)^(m2 + Floor[n2/m2]), {m2, 1 + a2, Floor[Sqrt[n2]]}]
ee9[n_, k_, a_] := Sum[((-1)^m)^k , {m, a + 1, Floor[n^(1/k)]}] +
  k Sum[ ((-1)^m)^(k - 1) (-1/2 (-1)^m + 1/2 (-1)^Floor[n/(m^(k-1))]), {m, a + 1, Floor[n^(1/k)]}] +
  (1/2 (-1 + k) k) Sum[
    ((-1)^m)^(k - 2) (Sum[(-1)^(m2 + Floor[(n/(m^(k-2)))/m2]), {m2, 1 + m, Floor[Sqrt[n/(m^(k-2))]]}]), {m, a + 1, Floor[n^(1/k)]}] +
  Sum[Binomial[k, j] ((-1)^m)^j ee9[n/(m^j), k - j, m],
   {m, a + 1, Floor[n^(1/k)]}, {j, 1, k - 3}]
ee9[
 10000,
 5,
 1]
```

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ee9a[n_, 0, a_] := 1

$$\text{ee9a[n\_, 1, a\_]} := -\frac{1}{2}\,(-1)^{a} + \frac{1}{2}\,(-1)^{\text{Floor[n]}}$$

$$\text{ee9a[n2\_, 2, a2\_]} := \sum_{m2=1+a2}^{\text{Floor}\left[\sqrt{n2}\right]} (-1)^{m2+\text{Floor}\left[\frac{n2}{m2}\right]}$$

$$\text{ee9a[n\_, 3, a\_]} := \text{Sum[((-1)\^{}m)\^{}3 , \{m, a + 1, Floor[n\^{}(1 / 3)]\}]} +$$
$$3\,\text{Sum}\left[\ \text{((-1)\^{}m)\^{}2}\left(-\frac{1}{2}\,(-1)^{m} + \frac{1}{2}\,(-1)^{\text{Floor[n/(m\^{}2)]}}\right),\ \text{\{m, a + 1, Floor[n\^{}(1 / 3)]\}}\right] +$$
$$3\,\text{Sum}\left[\ \text{((-1)\^{}m)}\left(\sum_{m2=1+m}^{\text{Floor}\left[\sqrt{n/m}\right]} (-1)^{m2+\text{Floor}\left[\frac{n/m}{m2}\right]}\right),\ \text{\{m, a + 1, Floor[n\^{}(1 / 3)]\}}\right]$$

$$\text{ee9a[n\_, k\_, a\_]} := \text{Sum[((-1)\^{}m)\^{}k , \{m, a + 1, Floor[n\^{}(1 / k)]\}]} +$$
$$k\,\text{Sum}\left[\ \text{((-1)\^{}m)\^{}(k - 1)}\left(-\frac{1}{2}\,(-1)^{m} + \frac{1}{2}\,(-1)^{\text{Floor[n/(m\^{}(k-1))]}}\right),\ \text{\{m, a + 1, Floor[n\^{}(1 / k)]\}}\right] +$$
$$\left(\frac{1}{2}\,(-1 + k)\,k\right)\text{Sum}\Big[$$
$$\text{((-1)\^{}m)\^{}(k - 2)}\left(\sum_{m2=1+m}^{\text{Floor}\left[\sqrt{n/(m\^{}(k-2))}\right]} (-1)^{m2+\text{Floor}\left[\frac{(n/(m\^{}(k-2)))}{m2}\right]}\right),\ \text{\{m, a + 1, Floor[n\^{}(1 / k)]\}}\Big] +$$

```
  Sum[Binomial[k, j] ((-1)^m)^j ee9a[n / (m^j), k - j, m],
   {m, a + 1, Floor[n^(1 / k)]}, {j, 1, k - 3}]
ee9a[
 10 000,
 5,
 1]
```

-1139

$$\text{ee9a}[n\_,\ 0,\ a\_] := 1$$

$$\text{ee9a}[n\_,\ 1,\ a\_] := -\frac{1}{2}\ (-1)^{a} + \frac{1}{2}\ (-1)^{\text{Floor}[n]}$$

$$\text{ee9b}[n2\_,\ 2,\ a2\_] := \sum_{m2=1+a2}^{\text{Floor}\left[\sqrt{n2}\right]} (-1)^{m2+\text{Floor}\left[\frac{n2}{m2}\right]}$$

$$\text{ee9b}[n\_,\ 3,\ a\_] := \left(\frac{1}{2}\left(-(-1)^{3\,a} + (-1)^{3\,\text{Floor}\left[n^{1/3}\right]}\right)\right) + \left(\frac{3}{4}\left((-1)^{a} - (-1)^{\text{Floor}\left[n^{1/3}\right]}\right)\right) + \frac{3}{2}\sum_{m=1+a}^{\text{Floor}\left[n^{1/3}\right]} (-1)^{\text{Floor}\left[\frac{n}{m^2}\right]} + 3\,\text{Sum}\left[\ ((-1)\,\text{^}m)\left(\sum_{m2=1+m}^{\text{Floor}\left[\sqrt{n/m}\right]} (-1)^{m2+\text{Floor}\left[\frac{n/m}{m2}\right]}\right),\ \{m,\ a+1,\ \text{Floor}[n\,\text{^}\,(1/3)]\}\right]$$

$$\text{ee9b}[n\_,\ k\_,\ a\_] := \text{Sum}[((-1)\,\text{^}m)\,\text{^}k,\ \{m,\ a+1,\ \text{Floor}[n\,\text{^}\,(1/k)]\}] + k\,\text{Sum}\left[\ ((-1)\,\text{^}m)\,\text{^}\,(k-1)\left(-\frac{1}{2}\ (-1)^{m} + \frac{1}{2}\ (-1)^{\text{Floor}[n/(m\text{^}(k-1))]}\right),\ \{m,\ a+1,\ \text{Floor}[n\,\text{^}\,(1/k)]\}\right] + \left(\frac{1}{2}\ (-1+k)\ k\right)\text{Sum}\left[\ ((-1)\,\text{^}m)\,\text{^}\,(k-2)\left(\sum_{m2=1+m}^{\text{Floor}\left[\sqrt{n/(m\text{^}(k-2))}\right]} (-1)^{m2+\text{Floor}\left[\frac{(n/(m\text{^}(k-2)))}{m2}\right]}\right),\ \{m,\ a+1,\ \text{Floor}[n\,\text{^}\,(1/k)]\}\right] + \text{Sum}[\text{Binomial}[k,\ j]\ ((-1)\,\text{^}m)\,\text{^}j\ \text{ee9b}[n/(m\text{^}j),\ k-j,\ m],\ \{m,\ a+1,\ \text{Floor}[n\,\text{^}\,(1/k)]\},\ \{j,\ 1,\ k-3\}]$$

```
ee9b[
 10 000,
 5,
 1]
```

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