```
ClearAll["Global`*"]

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
D2a[n_, k_] := D2a[n, k] = Sum[D2a[Floor[n / j], k - 1], {j, 2, n}]; D2a[n_, 0] := 1
DD[n_, z_] := DD[n, z] = Sum[FactorialPower[z, a] / a! D2a[n, a], {a, 0, Log[2, n]}]
EE[n_, z_, b_] :=
 EE[n, z, b] = Sum[FactorialPower[z, a] / a! E2a[n, a, b], {a, 0, Log[If[b > 2, 2, b], n]}]
D1b[n_, k_, b_] := Sum[Binomial[k + j - 1, k - 1] b^j E1b[n / b^j, k, b], {j, 0, Log[b, n]}]
E1b[n_, k_, b_] := Sum[FactorialPower[k, a] / a! E2b[n, a, b], {a, 0, Log[If[b > 2, 2, b], n]}]
E2b[n_, k_, a_] :=
 E2b[n, k, a] = Sum[E2b[n / j, k - 1, a], {j, 2, n}] - Sum[E2b[n / (a j), k - 1, a], {j, 1, n / a}];
E2b[n_, 0, a_] := 1
D1c[n_, k_, b_] := Sum[Binomial[k + j - 1, k - 1] b^j (-1)^j
    Sum[FactorialPower[k, a] / a! E2b[n / b^j, a, b], {a, 0, Log[If[b > 2, 2, b], n / b^j]}],
   {j, 0, Log[b, n]}]
D1d[n_, z_, b_] := Sum[
  Binomial[z + j - 1, z - 1] Binomial[z, k] b^j (-1)^j E2[n / b^j, k, b],
   {j, 0, Log[b, n]}, {k, 0, Log[If[b > 2, 2, b], n / b^j]}]
D1e[n_, k_, b_] := Grid[Table[
    Binomial[k + j - 1, k - 1] Binomial[k, a] b^j (-1)^j E2[n / b^j, a, b],
     {j, 0, Log[b, n]}, {a, 0, Log[If[b > 2, 2, b], n / b^j]}]]
D1e2[n_, k_, b_] := Grid[Table[
    Binomial[k + j - 1, k - 1] FactorialPower[k, a] / a! b^j (-1)^j E2[n / b^j, a, b] / k,
     {j, 0, Log[b, n]}, {a, 0, Log[If[b > 2, 2, b], n / b^j]}]]
D1c2[n_, k_, b_] := Sum[Binomial[k + j - 1, k - 1] b^j (-1)^j
    Sum[FactorialPower[k, a] / a! E2b[n / b^j, a, b], {a, 0, Log[If[b > 2, 2, b], n / b^j]}],
   {j, 0, Log[b, n]}]
lin[n_, b_] := Sum[(-1)^(k + 1) / k E2b[n, k, b], {k, 1, Log[b, n]}]
M2[n_, a_] := Sum[(-1)^k (E2b[n, k, a] - a E2b[n / a, k, a]), {k, 0, Log[a, n]}]

DiscretePlot[(DD[n, .000001] - 1) / .000001, {n, 1, 100}]
```
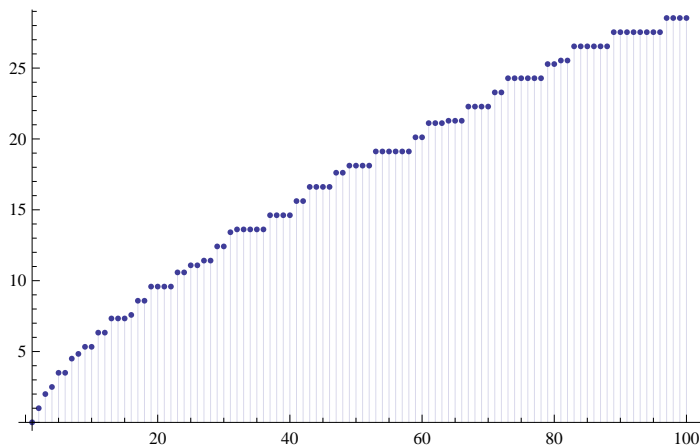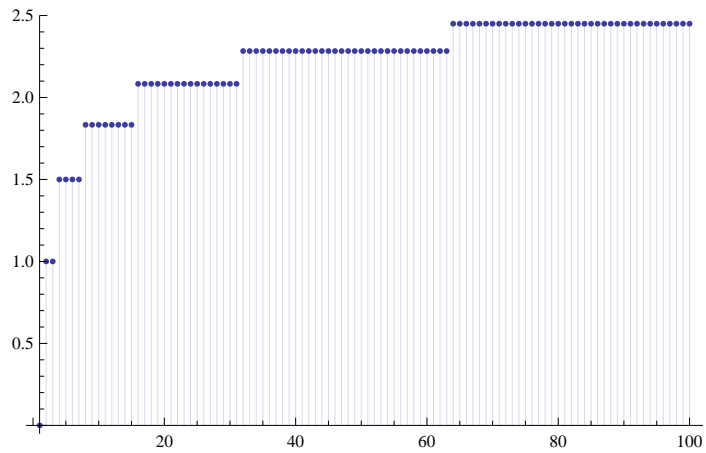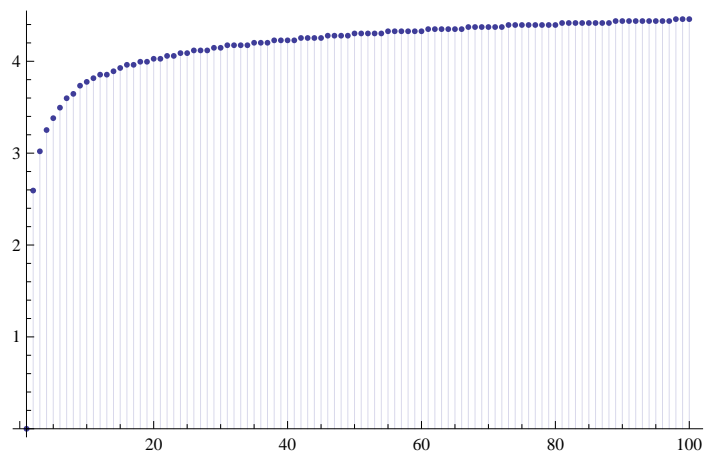
**DiscretePlot[ lin[n, 2], {n, 1, 100}]**
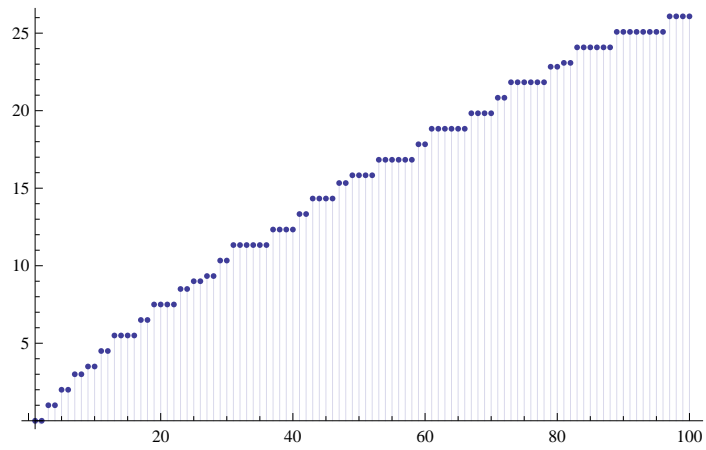


**DiscretePlot[ (DD[n, .000001] - 1) / .000001 - lin[n, 2], {n, 1, 100}]**



**DiscretePlot[ (DD[n, .000001] - 1) / .000001 - lin[n, 1.1], {n, 1, 100}]**



**fdif[n_, a_] := Sum[ (-1) ^ (0) a ^ (0 k) / k, {k, 1, Log[a, n]}]**
**fdif[100, 1.000001]**

15.9199

**D1c[30, -1, 1.1]**

$-3.$

**(D1c2[100, .0000001, 2] - 1) / .0000001**

$28.5333$

**lin[100, 2]**

$$\frac{344}{15}$$

**D1e2[100, .0000001, 2]**

$1. \times 10^7$ E2[100, 0, 2]   $1.$ E2[100, 1, 2]   $-0.5$ E2[100, 2, 2]   $0.333333$ E2[100, 3, 2]   $-0.25$ E2[100, 4, 2]   $0.2$ E2[100, 5, 2]   $-0.166667$ E2[100, 6, 2]

$-2.$ E2[50, 0, 2]   $-2. \times 10^{-7}$ E2[50, 1, 2]   $1. \times 10^{-7}$ E2[50, 2, 2]   $-6.66667 \times 10^{-8}$ E2[50, 3, 2]   $5. \times 10^{-8}$ E2[50, 4, 2]   $-4. \times 10^{-8}$ E2[50, 5, 2]

$2.$ E2[25, 0, 2]   $2. \times 10^{-7}$ E2[25, 1, 2]   $-1. \times 10^{-7}$ E2[25, 2, 2]   $6.66667 \times 10^{-8}$ E2[25, 3, 2]   $-5. \times 10^{-8}$ E2[25, 4, 2]

$-2.66667$ E2$\left[\frac{25}{2}, 0, 2\right]$   $-2.66667 \times 10^{-7}$ E2$\left[\frac{25}{2}, 1, 2\right]$   $1.33333 \times 10^{-7}$ E2$\left[\frac{25}{2}, 2, 2\right]$   $-8.88889 \times 10^{-8}$ E2$\left[\frac{25}{2}, 3, 2\right]$

$4.$ E2$\left[\frac{25}{4}, 0, 2\right]$   $4. \times 10^{-7}$ E2$\left[\frac{25}{4}, 1, 2\right]$   $-2. \times 10^{-7}$ E2$\left[\frac{25}{4}, 2, 2\right]$

$-6.4$ E2$\left[\frac{25}{8}, 0, 2\right]$   $-6.4 \times 10^{-7}$ E2$\left[\frac{25}{8}, 1, 2\right]$

$10.6667$ E2$\left[\frac{25}{16}, 0, 2\right]$

**D1e[100, -1, 2]**

| E2[100, 0, 2] | -E2[100, 1, 2] | E2[100, 2, 2] | -E2[100, 3, 2] | E2[100, 4, 2] | -E2[100, 5, 2] | E2[100, 6, 2] |
|---|---|---|---|---|---|---|
| 2 E2[50, 0, 2] | -2 E2[50, 1, 2] | 2 E2[50, 2, 2] | -2 E2[50, 3, 2] | 2 E2[50, 4, 2] | -2 E2[50, 5, 2] | |
| 0 | 0 | 0 | 0 | 0 | | |
| 0 | 0 | 0 | 0 | | | |
| 0 | 0 | 0 | | | | |
| 0 | 0 | | | | | |
| 0 | | | | | | |

**D1e[900, 1, 2]**

| E2[900, 0, 2] | E2[900, 1, 2] | 0 0 0 0 0 0 0 0 |
|---|---|---|
| -2 E2[450, 0, 2] | -2 E2[450, 1, 2] | 0 0 0 0 0 0 0 |
| 4 E2[225, 0, 2] | 4 E2[225, 1, 2] | 0 0 0 0 0 0 |
| -8 E2$\left[\frac{225}{2}, 0, 2\right]$ | -8 E2$\left[\frac{225}{2}, 1, 2\right]$ | 0 0 0 0 0 |
| 16 E2$\left[\frac{225}{4}, 0, 2\right]$ | 16 E2$\left[\frac{225}{4}, 1, 2\right]$ | 0 0 0 0 |
| -32 E2$\left[\frac{225}{8}, 0, 2\right]$ | -32 E2$\left[\frac{225}{8}, 1, 2\right]$ | 0 0 0 |
| 64 E2$\left[\frac{225}{16}, 0, 2\right]$ | 64 E2$\left[\frac{225}{16}, 1, 2\right]$ | 0 0 |
| -128 E2$\left[\frac{225}{32}, 0, 2\right]$ | -128 E2$\left[\frac{225}{32}, 1, 2\right]$ | 0 |
| 256 E2$\left[\frac{225}{64}, 0, 2\right]$ | 256 E2$\left[\frac{225}{64}, 1, 2\right]$ | |
| -512 E2$\left[\frac{225}{128}, 0, 2\right]$ | | |

**D1e[900, 2, 2]**

| E2[900, 0, 2] | 2 E2[900, 1, 2] | E2[900, 2, 2] | 0 0 0 0 0 0 0 |
|---|---|---|---|
| -4 E2[450, 0, 2] | -8 E2[450, 1, 2] | -4 E2[450, 2, 2] | 0 0 0 0 0 0 |
| 12 E2[225, 0, 2] | 24 E2[225, 1, 2] | 12 E2[225, 2, 2] | 0 0 0 0 0 |
| -32 E2$\left[\frac{225}{2}, 0, 2\right]$ | -64 E2$\left[\frac{225}{2}, 1, 2\right]$ | -32 E2$\left[\frac{225}{2}, 2, 2\right]$ | 0 0 0 0 |
| 80 E2$\left[\frac{225}{4}, 0, 2\right]$ | 160 E2$\left[\frac{225}{4}, 1, 2\right]$ | 80 E2$\left[\frac{225}{4}, 2, 2\right]$ | 0 0 0 |
| -192 E2$\left[\frac{225}{8}, 0, 2\right]$ | -384 E2$\left[\frac{225}{8}, 1, 2\right]$ | -192 E2$\left[\frac{225}{8}, 2, 2\right]$ | 0 0 |
| 448 E2$\left[\frac{225}{16}, 0, 2\right]$ | 896 E2$\left[\frac{225}{16}, 1, 2\right]$ | 448 E2$\left[\frac{225}{16}, 2, 2\right]$ | 0 |
| -1024 E2$\left[\frac{225}{32}, 0, 2\right]$ | -2048 E2$\left[\frac{225}{32}, 1, 2\right]$ | -1024 E2$\left[\frac{225}{32}, 2, 2\right]$ | |
| 2304 E2$\left[\frac{225}{64}, 0, 2\right]$ | 4608 E2$\left[\frac{225}{64}, 1, 2\right]$ | | |
| -5120 E2$\left[\frac{225}{128}, 0, 2\right]$ | | | |

**DD[100, -1]**

1

**DiscretePlot[ DD[n, -1], {n, 1, 100}]**
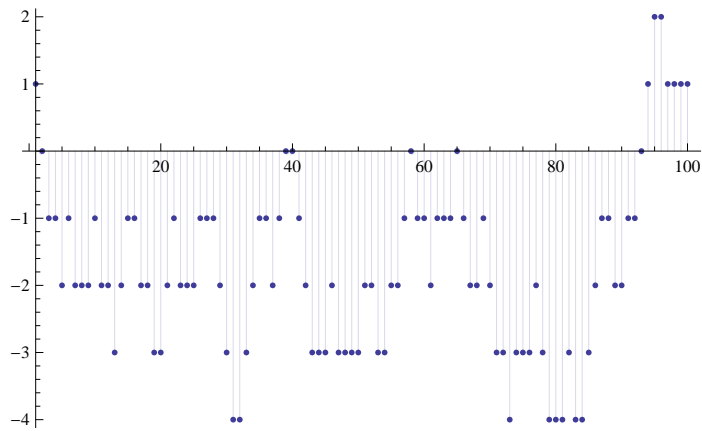


**DiscretePlot[ EE[n, -1, 200], {n, 1, 100}]**



**Animate[DiscretePlot[ EE[n, 7, z], {n, 1, 100}], {z, 2, 100}]**

**Animate[DiscretePlot[ EE[n, -1, z], {n, 1, 100}], {z, 2, 100}]**
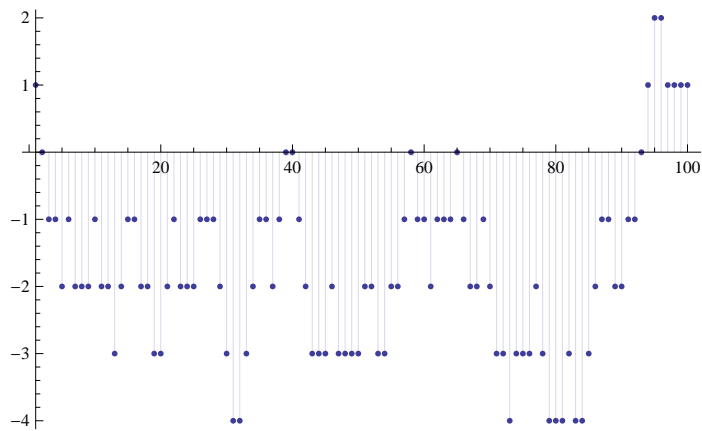
**Animate[DiscretePlot[( EE[n, .0001, z] - 1) / .0001, {n, 1, 100}], {z, 2, 100}]**

**D1d[1000, -3 / 2, 2]**

$$-\frac{143}{128}\,E2\!\left[\frac{125}{64},0,2\right] + \frac{99}{128}\,E2\!\left[\frac{125}{32},0,2\right] - \frac{297}{256}\,E2\!\left[\frac{125}{32},1,2\right] - \frac{9}{16}\,E2\!\left[\frac{125}{16},0,2\right] +$$

$$\frac{27}{32}\,E2\!\left[\frac{125}{16},1,2\right] - \frac{135}{128}\,E2\!\left[\frac{125}{16},2,2\right] + \frac{7}{16}\,E2\!\left[\frac{125}{8},0,2\right] - \frac{21}{32}\,E2\!\left[\frac{125}{8},1,2\right] +$$

$$\frac{105}{128}\,E2\!\left[\frac{125}{8},2,2\right] - \frac{245}{256}\,E2\!\left[\frac{125}{8},3,2\right] - \frac{3}{8}\,E2\!\left[\frac{125}{4},0,2\right] + \frac{9}{16}\,E2\!\left[\frac{125}{4},1,2\right] -$$

$$\frac{45}{64}\,E2\!\left[\frac{125}{4},2,2\right] + \frac{105}{128}\,E2\!\left[\frac{125}{4},3,2\right] - \frac{945\,E2\!\left[\frac{125}{4},4,2\right]}{1024} + \frac{3}{8}\,E2\!\left[\frac{125}{2},0,2\right] - \frac{9}{16}\,E2\!\left[\frac{125}{2},1,2\right] +$$

$$\frac{45}{64}\,E2\!\left[\frac{125}{2},2,2\right] - \frac{105}{128}\,E2\!\left[\frac{125}{2},3,2\right] + \frac{945\,E2\!\left[\frac{125}{2},4,2\right]}{1024} - \frac{2079\,E2\!\left[\frac{125}{2},5,2\right]}{2048} -$$

$$\frac{1}{2}\,E2[125,0,2] + \frac{3}{4}\,E2[125,1,2] - \frac{15}{16}\,E2[125,2,2] + \frac{35}{32}\,E2[125,3,2] - \frac{315}{256}\,E2[125,4,2] +$$

$$\frac{693}{512}\,E2[125,5,2] - \frac{3003\,E2[125,6,2]}{2048} + \frac{3}{2}\,E2[250,0,2] - \frac{9}{4}\,E2[250,1,2] + \frac{45}{16}\,E2[250,2,2] -$$

$$\frac{105}{32}\,E2[250,3,2] + \frac{945}{256}\,E2[250,4,2] - \frac{2079}{512}\,E2[250,5,2] + \frac{9009\,E2[250,6,2]}{2048} -$$

$$\frac{19\,305\,E2[250,7,2]}{4096} + 3\,E2[500,0,2] - \frac{9}{2}\,E2[500,1,2] + \frac{45}{8}\,E2[500,2,2] -$$

$$\frac{105}{16}\,E2[500,3,2] + \frac{945}{128}\,E2[500,4,2] - \frac{2079}{256}\,E2[500,5,2] + \frac{9009\,E2[500,6,2]}{1024} -$$

$$\frac{19\,305\,E2[500,7,2]}{2048} + \frac{328\,185\,E2[500,8,2]}{32\,768} + E2[1000,0,2] - \frac{3}{2}\,E2[1000,1,2] +$$

$$\frac{15}{8}\,E2[1000,2,2] - \frac{35}{16}\,E2[1000,3,2] + \frac{315}{128}\,E2[1000,4,2] - \frac{693}{256}\,E2[1000,5,2] +$$

$$\frac{3003\,E2[1000,6,2]}{1024} - \frac{6435\,E2[1000,7,2]}{2048} + \frac{109\,395\,E2[1000,8,2]}{32\,768} - \frac{230\,945\,E2[1000,9,2]}{65\,536}$$

**D1e[900, -1, 2]**

| E2[900, 0, 2] | −E2[900, 1, 2] | E2[900, 2, 2] | −E2[900, 3, 2] | E2[900, 4, 2] | −E2[900, 5, 2] | E2[900, 6, 2] | −E2[900, 7, 2] | E2[900, 8, 2] | −E2[900, 9, 2] |
|---|---|---|---|---|---|---|---|---|---|
| 2 E2[450, 0, 2] | −2 E2[450, 1, 2] | 2 E2[450, 2, 2] | −2 E2[450, 3, 2] | 2 E2[450, 4, 2] | −2 E2[450, 5, 2] | 2 E2[450, 6, 2] | −2 E2[450, 7, 2] | 2 E2[450, 8, 2] | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| 0 | 0 | 0 | 0 | 0 | | | | | |
| 0 | 0 | 0 | 0 | | | | | | |
| 0 | 0 | 0 | | | | | | | |
| 0 | 0 | | | | | | | | |
| 0 | | | | | | | | | |

```
D1f[n_, k_, b_] := Sum[
  Binomial[k + j - 1, k - 1] Binomial[k, a] b^j E2a[n / b^j, a, b],
  {j, 0, Log[b, n]}, {a, 0, Log[If[b > 2, 2, b], n / b^j]}]


ME2[n_, b_] := Sum[ (-1)^k E2a[n, k, b], {k, 0, Log[If[b < 2, b, 2], n]}]
ME2a[n_, b_] := ME2[n, b] - b ME2[n / b, b]
ME2b[n_, a_] := Sum[ (-1)^k (E2a[n, k, a] - a E2a[n / a, k, a]), {k, 0, Log[If[a < 2, a, 2], n]}]

ME2[100, 2]
```

–13

```
M2[n_, a_] := Sum[ (-1)^k (k + 1) (E2a[n, k, a] - 2 a E2a[n / a, k, a] + a^2 E2a[n / (a^2), k, a]),
  {k, 0, Log[If[a < 2, a, 2], n]}]


M2[100, 4]
```

19

```
DD[100, -2]
```

19

```
D1c[100, -2, 2]
```

19

```
D1e[2400, -2, 3]
```

E2[	– 2 E2[	3 E2[	– 4 E2[	5 E2[	– 6 E2[	7 E2[	– 8 E2[	9 E2[	– 10	11 E2[	– 12
2400,	2400	2400	2400	2400	2400	2400	2400	2400	E2[	2400	E2[
0, 3]	,	,	,	,	,	,	,	,	2400	,	2400
	1,	2,	3,	4,	5,	6,	7,	8,	,	10,	,
	3]	3]	3]	3]	3]	3]	3]	9,	3]	11,
									3]		3]

6 E2[	– 12	18 E2[	– 24	30 E2[	– 36	42 E2[	– 48	54 E2[	– 60
800,	E2[	800,	E2[	800,	E2[	800,	E2[	800,	E2[
0,	800,	2,	800,	4,	800,	6,	800,	8,	800,
3]	1,	3]	3,	5,	3]	7,	3]	9,
	3]		3]		3]		3]		3]

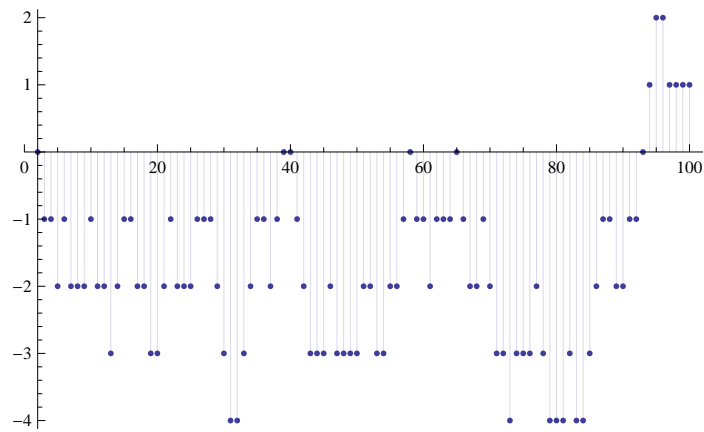| 9 E2[	– 18	27 E2[	– 36	45 E2[	– 54	63 E2[	– 72	81 E2[
800	E2[	800	E2[	800	E2[	800	E2[	800
/	800	/	800	/	800	/	800	/
3,	/	3,	/	3,	/	3,	/	3,
0,	3,	2,	3,	4,	3,	6,	3,	8,
3]	1,	3]	3,	3]	5,	3]	7,	3]
	3]		3]		3]		3]
0	0	0	0	0	0	0
0	0	0	0	0
0	0	0	0
0	0
0

DiscretePlot[ME2b[n, 2], {n, 2, 100}]
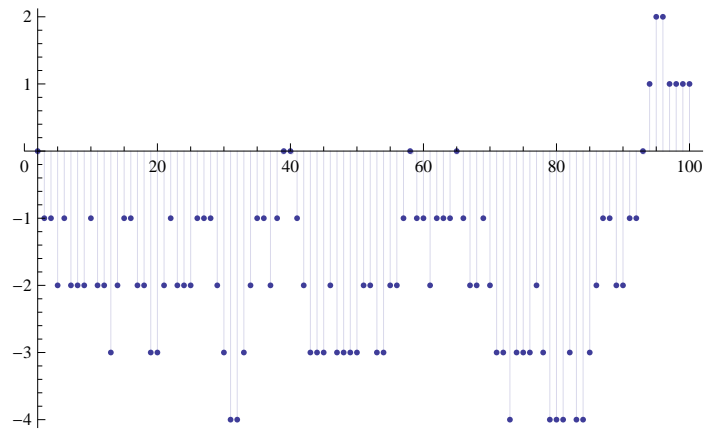
DiscretePlot[D1f[n, -1, 2], {n, 2, 100}]
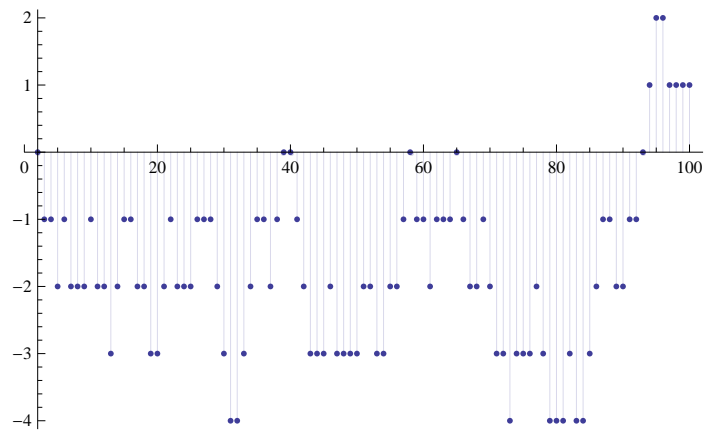
DiscretePlot[ME2[n, (3 / 2)] - (3 / 2) ME2[n / (3 / 2), (3 / 2)], {n, 2, 100}]

```
DiscretePlot[(-1)^k (E2a[100, k, 1.0001] - 1.0001 E2a[100 / 1.0001, k, 1.0001]),
 {k, 0, 120}, PlotRange → {{0, 120}, {-1, 1}}]
```



```
D1e[2400, -2, 7]
```

E2[	−2 E2[	3 E2[	−4 E2[	5 E2[	−6 E2[	7 E2[	−8 E2[	9 E2[	−10	11 E2[	−12
2400,	2400	2400	2400	2400	2400	2400	2400	2400	E2[	2400	E2[
0, 7]	,	,	,	,	,	,	,	,	2400	,	2400
	1,	2,	3,	4,	5,	6,	7,	8,	,	10,	,
	7]	7]	7]	7]	7]	7]	7]	9,	7]	11,
									7]		7]

14 E2[	−28	42 E2[	−56	70 E2[	−84	98 E2[	−112	126
2400	E2[	2400	E2[	2400	E2[	2400	E2[	E2[
/	2400	/	2400	/	2400	/	2400	2400
7,	/	7,	/	7,	/	7,	/	/
0,	7,	2,	7,	4,	7,	6,	7,	7,
7]	1,	7]	3,	7]	5,	7]	7,	8,
	7]		7]		7]		7]	7]

49 E2[	−98	147	−196	245	−294
2400	E2[	E2[	E2[	E2[	E2[
/	2400	2400	2400	2400	2400
49,	/	/	/	/	/
0,	49,	49,	49,	49,	49,
7]	1,	2,	3,	4,	5,
	7]	7]	7]	7]	7]
0	0	0

```
D1e[1200, -3, 2]
```

E2[1200, 0, 2] -3 E2[1200, 1, 2] 6 E2[1200, 2, 2] -10 E2[1200, 3, 2] 15 E2[1200, 4, 2] -21 E2[1200, 5, 2] 28 E2[1200, 6, 2] -36 E2[1200, 7, 2] 45 E2[1200, 8, 2] -55 E2[1200, 9, 2] 66 E2[1200, 10, 2]

6 E2[600, 0, 2] -18 E2[600, 1, 2] 36 E2[600, 2, 2] -60 E2[600, 3, 2] 90 E2[600, 4, 2] -126 E2[600, 5, 2] 168 E2[600, 6, 2] -216 E2[600, 7, 2] 270 E2[600, 8, 2] -330 E2[600, 9, 2]

12 E2[300, 0, 2] -36 E2[300, 1, 2] 72 E2[300, 2, 2] -120 E2[300, 3, 2] 180 E2[300, 4, 2] -252 E2[300, 5, 2] 336 E2[300, 6, 2] -432 E2[300, 7, 2] 540 E2[300, 8, 2]

8 E2[150, 0, 2] -24 E2[150, 1, 2] 48 E2[150, 2, 2] -80 E2[150, 3, 2] 120 E2[150, 4, 2] -168 E2[150, 5, 2] 224 E2[150, 6, 2] -288 E2[150, 7, 2]

0 0 0 0 0 0 0

0 0 0 0 0 0

0 0 0 0 0

0 0 0 0

0 0 0

0 0

0

```
$RecursionLimit = 10 000
```

10 000

```
Table[{1.0001^k, (-1)^k (E2a[100, k, 1.0001] - 1.0001 E2a[100 / 1.0001, k, 1.0001])},
  {k, 0, 200}] // TableForm
```

$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

```
N[Table[{k, (-1)^k (E2a[1000, k, ss = 2] + ss E2a[1000 / ss, k, ss])}, {k, 0, 20}] // TableForm]
```

```
0.     3.
1.     3.
2.     -8.
3.     25.
4.     -130.
5.     -260.
6.     22.
7.     -60.
8.     -49.
9.     -8.
10.    0.
11.    0.
12.    0.
13.    0.
14.    0.
15.    0.
16.    0.
17.    0.
18.    0.
19.    0.
20.    0.
```

```
N[Table[{k, (-1)^k (E2a[10 000, k, ss = 2] + ss E2a[1000 / ss, k, ss])}, {k, 0, 20}] // TableForm]
```

```
0.     3.
1.     3.
2.     3.
3.     12.
4.     297.
5.     -1209.
6.     -796.
7.     1213.
8.     -182.
9.     1018.
10.    939.
11.    320.
12.    67.
13.    1.
14.    0.
15.    0.
16.    0.
17.    0.
18.    0.
19.    0.
20.    0.
```

```
Binomial[z, 0]
```

```
1
```

```
Limit[ Sum[ Binomial[z + j - 1, z - 1] a^j, {j, 0, Log[a, n]}] /. z → 1, a → 1]
```

```
DirectedInfinity[-1 + n]
```

```
D1e[100, -3, 2]
```

| E2[100,	-3 E2[	6 E2[100,	-10 E2[	15 E2[	-21 E2[	28 E2[
0, 2]	100, 1, 2]	2, 2]	100, 3, 2]	100, 4, 2]	100, 5, 2]	100, 6, 2]
6 E2[50,	-18 E2[	36 E2[	-60 E2[	90 E2[	-126 E2[	
0, 2]	50, 1, 2]	50, 2, 2]	50, 3, 2]	50, 4, 2]	50, 5, 2]	
12 E2[	-36 E2[	72 E2[	-120 E2[	180 E2[		
25, 0, 2]	25, 1, 2]	25, 2, 2]	25, 3, 2]	25, 4, 2]		
8 E2[$\frac{25}{2}$,	-24 E2[	48 E2[	-80 E2[			
0, 2]	$\frac{25}{2}$, 1, 2]	$\frac{25}{2}$, 2, 2]	$\frac{25}{2}$, 3, 2]			
0	0	0				
0	0					
0						

```
$RecursionLimit = 1 000 000
dr[n_, k_, b_] := DiscretePlot[ Binomial[k + j - 1, k - 1] b^j (-1)^j
   Sum[FactorialPower[k, a] / a! E2b[n / b^j, a, b], {a, 0, Log[If[b > 2, 2, b], n / b^j]}],
  {j, 0, Log[b, n]}]
```
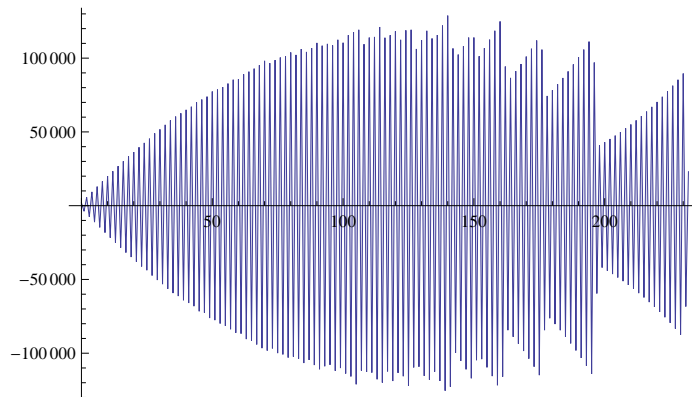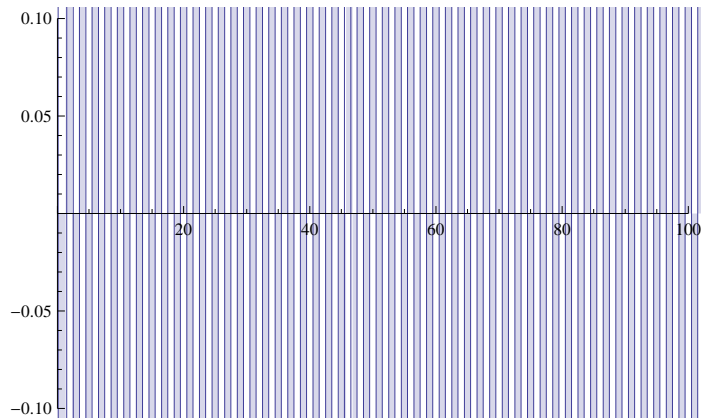
1 000 000

```
dr[100, 1, 1.02]
```
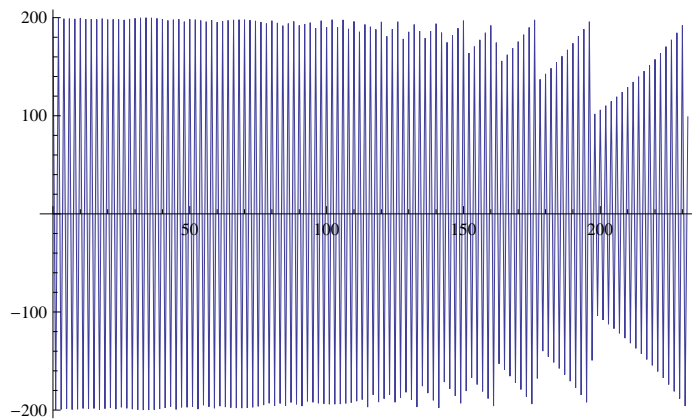


```
dr[100, 2, 1.02]
```

```
Dr2[n_, k_, b_] := DiscretePlot[Sum[ Binomial[k + j - 1, k - 1] b^j (-1) ^j
    Sum[FactorialPower[k, a] / a ! E2b[n / b^j, a, b], {a, s, s}], {j, 0, Log[b, n]}],
  {s, 0, Log[b, n]}, PlotRange → {{0, 100}, {-.1, .1}}]
```

```
Dr2[5, -1, 1.005]
```



```
Dr3[n_, k_, b_] := Table[{b^s, Sum[ Binomial[k + j - 1, k - 1] b^j
      Sum[FactorialPower[k, a] / a ! E2b[n / b^j, a, b], {a, s, s}], {j, 0, Log[b, n]}]},
  {s, 0, Log[b, n]}] // TableForm
```

```
Dr3[12, -1, 1.02]
```

1.	-0.02
1.02	-0.5756
1.0404	2.50217
1.06121	0.444801
1.08243	-2.06826
1.10408	5.22111
1.12616	-16.5302
1.14869	24.2717
1.17166	-34.1435
1.19509	-52.2886
1.21899	172.532
1.24337	-63.0479
1.26824	-87.5836
1.29361	110.314
1.31948	4.31786
1.34587	-137.993
1.37279	-31.8071
1.40024	229.224
1.42825	-273.9
1.45681	324.691
1.48595	1951.99
1.51567	-6959.36
1.54598	7414.56
1.5769	-2529.08
1.60844	-113.67
1.64061	125.599
1.67342	-138.353
1.70689	104.961
1.74102	-116.76
1.77584	179.896

```
1.81136    -196.214
1.84759     213.547
1.88454    -231.939
1.92223     251.433
1.96068    -272.076
1.99989    -2204.95
2.03989     4949.83
2.08069    -2542.92
2.1223     -129.849
2.16474     139.241
2.20804    -149.13
2.2522      159.536
2.29724    -170.479
2.34319     181.979
2.39005    -86.7932
2.43785     94.8425
2.48661    -215.515
2.53634     229.279
2.58707    -243.709
2.63881     258.832
2.69159    -274.674
2.74542     291.261
2.80033    -308.621
2.85633     326.784
2.91346    -345.778
2.97173    -4302.36
3.03117     9216.11
3.09179    -4728.86
3.15362    -14.5524
3.2167      15.0983
3.28103    -15.6602
3.34665     16.2385
3.41358    -16.8337
3.48186     17.4461
3.55149    -18.0764
3.62252     18.7249
3.69497    -19.3921
3.76887     20.0785
3.84425    -20.7846
3.92114     21.5109
3.99956     263.311
4.07955    -272.415
4.16114    -11.9498
4.24436     12.3569
4.32925    -12.7755
4.41584     13.2059
4.50415    -13.6485
4.59424     14.1034
4.68612    -14.5711
4.77984     15.0518
4.87544    -15.546
4.97295     16.0538
5.07241    -16.5758
5.17386     17.1123
5.27733    -17.6635
5.38288     18.23
```

```
5.49054    -18.8121
5.60035    19.4101
5.71235    -20.0246
5.8266     20.6559
5.94313    524.275
6.062      -540.704
6.18324    -0.123665
6.3069     0.126138
6.43304    -0.128661
6.5617     0.131234
6.69293    -0.133859
6.82679    0.136536
6.96333    -0.139267
7.10259    0.142052
7.24465    -0.144893
7.38954    0.147791
7.53733    -0.150747
7.68808    0.153762
7.84184    -0.156837
7.99867    0.159973
8.15865    -0.163173
8.32182    0.166436
8.48826    -0.169765
8.65802    0.17316
8.83118    -0.176624
9.00781    0.180156
9.18796    -0.183759
9.37172    0.187434
9.55916    -0.191183
9.75034    0.195007
9.94535    -0.198907
10.1443    0.202885
10.3471    -0.206943
10.5541    0.211082
10.7652    -0.215303
10.9805    0.219609
11.2001    -0.224002
11.4241    0.228482
11.6526    -0.233051
11.8856    -11.8856
```

DD[5, -1]

-2

DD[6, -1]

-1

\$RecursionLimit = 10 000

10 000

Table[{k, (-1)^k (E2b[5, k, 1.01] - 1.01 E2b[5 / 1.01, k, 1.01]),
   (-1) ^ (k + 1) / k E2b[5, k, 1.01] }, {k, 1, Log[1.01, 5] + 10}] // TableForm

```
1    -0.9296      8.04
2    -0.172408    -8.6204
3    0.317254     10.5751
```

4	−0.506193	−12.6548
5	0.740504	14.8101
6	−1.02149	−17.0249
7	1.35049	19.2927
8	−1.72885	−21.6106
9	2.15796	23.9773
10	−2.63922	−26.3922
11	3.17408	28.8553
12	−3.764	−31.3667
13	4.41048	33.9268
14	−5.11504	−36.536
15	5.87922	39.1948
16	−6.70462	−41.9039
17	7.59284	44.6638
18	−8.54553	−47.4752
19	9.56436	50.3387
20	−10.651	−53.2552
21	11.8073	56.2252
22	305.027	−59.2496
23	−654.173	47.2432
24	342.316	−19.4209
25	1.28891	5.15563
26	−1.35335	−5.20519
27	1.41895	5.25538
28	−1.48573	−5.30619
29	1.55371	5.35761
30	−1.62289	−5.40963
31	1.6933	5.46227
32	−1.76496	−5.5155
33	1.83788	5.56934
34	−1.91209	−5.62379
35	1.98759	5.67883
36	−2.06442	−5.73449
37	2.14258	5.79075
38	−2.22209	−5.84762
39	2.30299	5.9051
40	−2.38528	−5.96319
41	2.46898	6.02191
42	−2.55412	−6.08125
43	2.64072	6.14121
44	−2.72879	−6.2018
45	2.81836	6.26303
46	−2.90945	−6.3249
47	3.00208	6.38741
48	−3.09627	−6.45057
49	3.19205	6.51438
50	−3.28943	−6.57885
51	−82.1737	6.64399
52	84.6231	−5.03211
53	1.80419	3.40413
54	−1.85629	−3.43757
55	1.90925	3.47136
56	−1.96309	−3.50551
57	2.01781	3.54001
58	−2.07343	−3.57487
59	2.12996	3.6101

60	− 2.18741	− 3.64568
61	2.2458	3.68164
62	− 2.30514	− 3.71797
63	2.36544	3.75467
64	− 2.42672	− 3.79174
65	2.48898	3.8292
66	− 2.55225	− 3.86705
67	2.61653	3.90528
68	− 2.68185	− 3.9439
69	2.74821	3.98291
70	− 2.81563	− 4.02233
71	2.88412	4.06214
72	− 2.9537	− 4.10236
73	3.02438	4.14299
74	− 3.09619	− 4.18404
75	3.16912	4.2255
76	− 3.24321	− 4.26738
77	3.31846	4.30968
78	− 3.39489	− 4.35242
79	3.47251	4.39559
80	− 3.55135	− 4.43919
81	3.63142	4.48324
82	− 3.71274	− 4.52773
83	3.79532	4.57267
84	− 3.87918	− 4.61807
85	3.96433	4.66392
86	− 4.05081	− 4.71024
87	4.13861	4.75702
88	− 4.22777	− 4.80428
89	4.31829	4.85201
90	− 4.41021	− 4.90023
91	4.50353	4.94893
92	227.502	− 4.99812
93	− 232.275	2.52498
94	− 0.0254806	− 0.027107
95	0.0257354	0.0270899
96	− 0.0259927	− 0.0270758
97	0.0262527	0.0270646
98	− 0.0265152	− 0.0270563
99	0.0267803	0.0270508
100	− 0.0270481	− 0.0270481
101	0.0273186	0.0270481
102	− 0.0275918	− 0.0270508
103	0.0278677	0.027056
104	− 0.0281464	− 0.0270638
105	0.0284279	0.0270742
106	− 0.0287121	− 0.0270869
107	0.0289993	0.0271021
108	− 0.0292893	− 0.0271197
109	0.0295822	0.0271396
110	− 0.029878	− 0.0271618
111	0.0301768	0.0271863
112	− 0.0304785	− 0.027213
113	0.0307833	0.0272419
114	− 0.0310911	− 0.0272729
115	0.031402	0.0273061

116	− 0.0317161	− 0.0273414
117	0.0320332	0.0273788
118	− 0.0323536	− 0.0274183
119	0.0326771	0.0274597
120	− 0.0330039	− 0.0275032
121	0.0333339	0.0275487
122	− 0.0336672	− 0.0275961
123	0.0340039	0.0276455
124	− 0.034344	− 0.0276967
125	0.0346874	0.0277499
126	− 0.0350343	− 0.027805
127	0.0353846	0.0278619
128	− 0.0357385	− 0.0279207
129	0.0360958	0.0279813
130	− 0.0364568	− 0.0280437
131	0.0368214	0.0281079
132	− 0.0371896	− 0.0281739
133	0.0375615	0.0282417
134	− 0.0379371	− 0.0283113
135	0.0383165	0.0283826
136	− 0.0386996	− 0.0284556
137	0.0390866	0.0285304
138	− 0.0394775	− 0.0286069
139	0.0398723	0.0286851
140	− 0.040271	− 0.028765
141	0.0406737	0.0288466
142	− 0.0410804	− 0.0289299
143	0.0414912	0.0290149
144	− 0.0419062	− 0.0291015
145	0.0423252	0.0291898
146	− 0.0427485	− 0.0292798
147	0.043176	0.0293714
148	− 0.0436077	− 0.0294647
149	0.0440438	0.0295596
150	− 0.0444842	− 0.0296562
151	0.0449291	0.0297544
152	− 0.0453784	− 0.0298542
153	0.0458321	0.0299557
154	− 0.0462905	− 0.0300587
155	0.0467534	0.0301635
156	− 0.0472209	− 0.0302698
157	0.0476931	0.0303778
158	− 0.04817	− 0.0304874
159	0.0486517	0.0305986
160	− 0.0491383	− 0.0307114
161	− 4.96296	0.0308259
162	0.	0.
163	0.	0.
164	0.	0.
165	0.	0.
166	0.	0.
167	0.	0.
168	0.	0.
169	0.	0.
170	0.	0.
171	0.	0.

-E2b[5, 161, 1.01] - 1.01 E2b[5 / 1.01, 161, 1.01]

4.96296

(-1)^159 (E2b[5, 159, 1.01] - 1.01 E2b[5 / 1.01, 159, 1.01])

-0.0486517