

$t[n_, a_] := \text{Mod}[n, a] - \text{Mod}[n - 1, a]$

$\text{Sum}[k, \{k, 1, n\}]$

$$\frac{1}{2} n (1 + n)$$

$\text{Sum}[(-1)^{(k+1)k}, \{k, 1, n\}]$

$$\frac{1}{4} (1 - (-1)^n - 2 (-1)^n n)$$

$\text{Sum}[k^2, \{k, 1, n\}]$

$$\frac{1}{6} n (1 + n) (1 + 2n)$$

$\text{Sum}[(-1)^{(k+1)k^2}, \{k, 1, n\}]$

$$-\frac{1}{2} (-1)^n n (1 + n)$$

$\text{Sum}[k^3, \{k, 1, n\}]$

$$\frac{1}{4} n^2 (1 + n)^2$$

$\text{Sum}[(-1)^{(k+1)k^3}, \{k, 1, n\}]$

$$\frac{1}{8} (-1 + (-1)^n - 6 (-1)^n n^2 - 4 (-1)^n n^3)$$

$\text{Sum}[(2k-1), \{k, 1, n\}]$

$$n^2$$

$\text{Sum}[(-1)^{(k+1)(2k-1)}, \{k, 1, n\}]$

$$-(-1)^n n$$

$\text{Sum}[(2k-1)^2, \{k, 1, n\}]$

$$\frac{1}{3} (-n + 4n^3)$$

$\text{Sum}[(-1)^{(k+1)(2k-1)^2}, \{k, 1, n\}]$

$$\frac{1}{2} (-1 + (-1)^n - 4 (-1)^n n^2)$$

$\text{Sum}[(2k-1)^3, \{k, 1, n\}]$

$$-n^2 + 2n^4$$

$\text{Sum}[(-1)^{(k+1)(2k-1)^3}, \{k, 1, n\}]$

$$-(-1)^n n (-3 + 4n^2)$$

$\text{Sum}[t[k, 2]k, \{k, 1, n\}]$

$$\begin{cases} 1 & n == 1 \\ -1 - 3 \text{Floor}\left[\frac{1}{2} (-2 + n)\right] - \text{Floor}\left[\frac{1}{2} (-2 + n)\right]^2 + 2 \text{Floor}\left[\frac{1}{2} (-1 + n)\right] + \text{Floor}\left[\frac{1}{2} (-1 + n)\right]^2 & \text{True} \end{cases}$$

Sum[t[k, 3] k, {k, 1, n}]

$$\left[\begin{array}{l} 1 \\ \frac{1}{2} \left(-6 - 18 \text{Floor}\left[\frac{1}{3}(-3+n)\right] - 6 \text{Floor}\left[\frac{1}{3}(-3+n)\right]^2 + 7 \text{Floor}\left[\frac{1}{3}(-2+n)\right] + \right. \\ \left. 3 \text{Floor}\left[\frac{1}{3}(-2+n)\right]^2 + 5 \text{Floor}\left[\frac{1}{3}(-1+n)\right] + 3 \text{Floor}\left[\frac{1}{3}(-1+n)\right]^2 \right) \end{array} \right] \quad n = 1 \quad \text{True}$$

Sum[t[k, 10] k, {k, 1, n}]

$$\left[\begin{array}{l} 1 \\ -45 - 135 \text{Floor}\left[\frac{1}{10}(-10+n)\right] - 45 \text{Floor}\left[\frac{1}{10}(-10+n)\right]^2 + 14 \text{Floor}\left[\frac{1}{10}(-9+n)\right] + \\ 5 \text{Floor}\left[\frac{1}{10}(-9+n)\right]^2 + 13 \text{Floor}\left[\frac{1}{10}(-8+n)\right] + 5 \text{Floor}\left[\frac{1}{10}(-8+n)\right]^2 + \\ 12 \text{Floor}\left[\frac{1}{10}(-7+n)\right] + 5 \text{Floor}\left[\frac{1}{10}(-7+n)\right]^2 + 11 \text{Floor}\left[\frac{1}{10}(-6+n)\right] + \\ 5 \text{Floor}\left[\frac{1}{10}(-6+n)\right]^2 + 10 \text{Floor}\left[\frac{1}{10}(-5+n)\right] + 5 \text{Floor}\left[\frac{1}{10}(-5+n)\right]^2 + \\ 9 \text{Floor}\left[\frac{1}{10}(-4+n)\right] + 5 \text{Floor}\left[\frac{1}{10}(-4+n)\right]^2 + 8 \text{Floor}\left[\frac{1}{10}(-3+n)\right] + 5 \text{Floor}\left[\frac{1}{10}(-3+n)\right]^2 + \\ 7 \text{Floor}\left[\frac{1}{10}(-2+n)\right] + 5 \text{Floor}\left[\frac{1}{10}(-2+n)\right]^2 + 6 \text{Floor}\left[\frac{1}{10}(-1+n)\right] + 5 \text{Floor}\left[\frac{1}{10}(-1+n)\right]^2 \end{array} \right] \quad n = 1 \quad \text{True}$$

Sum[t[k, 3] (2k-1), {k, 1, n}]

$$\left[\begin{array}{l} 1 \\ -8 - 18 \text{Floor}\left[\frac{1}{3}(-3+n)\right] - 6 \text{Floor}\left[\frac{1}{3}(-3+n)\right]^2 + 6 \text{Floor}\left[\frac{1}{3}(-2+n)\right] + \\ 3 \text{Floor}\left[\frac{1}{3}(-2+n)\right]^2 + 4 \text{Floor}\left[\frac{1}{3}(-1+n)\right] + 3 \text{Floor}\left[\frac{1}{3}(-1+n)\right]^2 + 2 \text{Floor}\left[\frac{n}{3}\right] \end{array} \right] \quad n = 1 \quad \text{True}$$

$$\text{pp}[n_] := -8 - 18 \text{Floor}\left[\frac{1}{3}(-3+n)\right] - 6 \text{Floor}\left[\frac{1}{3}(-3+n)\right]^2 + 6 \text{Floor}\left[\frac{1}{3}(-2+n)\right] + \\ 3 \text{Floor}\left[\frac{1}{3}(-2+n)\right]^2 + 4 \text{Floor}\left[\frac{1}{3}(-1+n)\right] + 3 \text{Floor}\left[\frac{1}{3}(-1+n)\right]^2 + 2 \text{Floor}\left[\frac{n}{3}\right]$$

pp[100]

1

```
Table[{n, pp[n]}, {n, 1, 50}] // TableForm
```

1	1
2	4
3	-6
4	1
5	10
6	-12
7	1
8	16
9	-18
10	1
11	22
12	-24
13	1
14	28
15	-30
16	1
17	34
18	-36
19	1
20	40
21	-42
22	1
23	46
24	-48
25	1
26	52
27	-54
28	1
29	58
30	-60
31	1
32	64
33	-66
34	1
35	70
36	-72
37	1
38	76
39	-78
40	1
41	82
42	-84
43	1
44	88
45	-90
46	1
47	94
48	-96
49	1
50	100

```
tri2[n_, a_] := Sum[t[k, a] k, {k, 1, n}]
```

```
Table[{n, tri2[n, 2], tri2[n, 3], tri2[n, 4], tri2[n, 5]}, {n, 1, 50}] // TableForm
```

1	1	1	1	1
2	-1	3	3	3
3	2	-3	6	6
4	-2	1	-6	10
5	3	6	-1	-10
6	-3	-6	5	-4
7	4	1	12	3
8	-4	9	-12	11
9	5	-9	-3	20
10	-5	1	7	-20
11	6	12	18	-9
12	-6	-12	-18	3
13	7	1	-5	16
14	-7	15	9	30
15	8	-15	24	-30
16	-8	1	-24	-14
17	9	18	-7	3
18	-9	-18	11	21
19	10	1	30	40
20	-10	21	-30	-40
21	11	-21	-9	-19
22	-11	1	13	3
23	12	24	36	26
24	-12	-24	-36	50
25	13	1	-11	-50
26	-13	27	15	-24
27	14	-27	42	3
28	-14	1	-42	31
29	15	30	-13	60
30	-15	-30	17	-60
31	16	1	48	-29
32	-16	33	-48	3
33	17	-33	-15	36
34	-17	1	19	70
35	18	36	54	-70
36	-18	-36	-54	-34
37	19	1	-17	3
38	-19	39	21	41
39	20	-39	60	80
40	-20	1	-60	-80
41	21	42	-19	-39
42	-21	-42	23	3
43	22	1	66	46
44	-22	45	-66	90
45	23	-45	-21	-90
46	-23	1	25	-44
47	24	48	72	3
48	-24	-48	-72	51
49	25	1	-23	100
50	-25	51	27	-100

```

ce := CoefficientList[Series[x / Log[1 + x], {x, 0, 10 000}], x]
N[ce[[950]]]
0.0000170911
N[Sum[ Abs[ce[[k]]], {k, 2, 9999}]]
$Aborted
cd[[3]]

$$-\frac{1}{12}$$

Integrate[ 2 / (2 - x y), {x, 0, 2}, {y, 0, 2}]

$$\frac{1}{2} \pi (\pi - 4 i \operatorname{Log}[2])$$

Integrate[ 1 / (1 - x y z w), {x, 0, 1}, {y, 0, 1}, {z, 0, 1}, {w, 0, 1}]

$$\frac{\pi^4}{90}$$

Integrate[ 1 / (1 - x y z), {x, 0, 1}, {y, 0, 1}, {z, 0, 1}]
Zeta[3]

N[Sum[ (-1)^n / n^Re[ZetaZero[1]] Cos[Im[ZetaZero[1] Log[n]]], {n, 1, 100 000}]]
0.00127694

```

```

t[n_, a_] := Mod[n, a] - Mod[n - 1, a]
tri2a[n_, a_, p_] := Sum[t[k, a] k^p, {k, 1, n}]
Table[{n, tri2a[n, 2, p], tri2a[n, 3, p], tri2a[n, 4, p], tri2a[n, 5, p]}, {n, 1, 50}] /.
  p -> 2 // TableForm

```

1	1	1	1	1
2	-3	5	5	5
3	6	-13	14	14
4	-10	3	-34	30
5	15	28	-9	-70
6	-21	-44	27	-34
7	28	5	76	15
8	-36	69	-116	79
9	45	-93	-35	160
10	-55	7	65	-240
11	66	128	186	-119
12	-78	-160	-246	25
13	91	9	-77	194
14	-105	205	119	390
15	120	-245	344	-510
16	-136	11	-424	-254
17	153	300	-135	35
18	-171	-348	189	359
19	190	13	550	720
20	-210	413	-650	-880
21	231	-469	-209	-439
22	-253	15	275	45
23	276	544	804	574
24	-300	-608	-924	1150
25	325	17	-299	-1350
26	-351	693	377	-674
27	378	-765	1106	55
28	-406	19	-1246	839
29	435	860	-405	1680
30	-465	-940	495	-1920
31	496	21	1456	-959
32	-528	1045	-1616	65
33	561	-1133	-527	1154
34	-595	23	629	2310
35	630	1248	1854	-2590
36	-666	-1344	-2034	-1294
37	703	25	-665	75
38	-741	1469	779	1519
39	780	-1573	2300	3040
40	-820	27	-2500	-3360
41	861	1708	-819	-1679
42	-903	-1820	945	85
43	946	29	2794	1934
44	-990	1965	-3014	3870
45	1035	-2085	-989	-4230
46	-1081	31	1127	-2114
47	1128	2240	3336	95
48	-1176	-2368	-3576	2399
49	1225	33	-1175	4800
50	-1275	2533	1325	-5200

```

t[n_, a_] := Mod[n, a] - Mod[n - 1, a]
tri2a[n_, a_, p_] := Sum[t[k, a] k^p, {k, 1, n}]
Table[{n, tri2a[n, 2, p], tri2a[n, 3, p], tri2a[n, 4, p], tri2a[n, 5, p]}, {n, 1, 50}] /.
  p -> 3 // TableForm

```

1	1	1	1	1
2	-7	9	9	9
3	20	-45	36	36
4	-44	19	-156	100
5	81	144	-31	-400
6	-135	-288	185	-184
7	208	55	528	159
8	-304	567	-1008	671
9	425	-891	-279	1400
10	-575	109	721	-2600
11	756	1440	2052	-1269
12	-972	-2016	-3132	459
13	1225	181	-935	2656
14	-1519	2925	1809	5400
15	1856	-3825	5184	-8100
16	-2240	271	-7104	-4004
17	2673	5184	-2191	909
18	-3159	-6480	3641	6741
19	3700	379	10500	13600
20	-4300	8379	-13500	-18400
21	4961	-10143	-4239	-9139
22	-5687	505	6409	1509
23	6480	12672	18576	13676
24	-7344	-14976	-22896	27500
25	8281	649	-7271	-35000
26	-9295	18225	10305	-17424
27	10388	-21141	29988	2259
28	-11564	811	-35868	24211
29	12825	25200	-11479	48600
30	-14175	-28800	15521	-59400
31	15616	991	45312	-29609
32	-17152	33759	-52992	3159
33	18785	-38115	-17055	39096
34	-20519	1189	22249	78400
35	22356	44064	65124	-93100
36	-24300	-49248	-74844	-46444
37	26353	1405	-24191	4209
38	-28519	56277	30681	59081
39	30800	-62361	90000	118400
40	-33200	1639	-102000	-137600
41	35721	70560	-33079	-68679
42	-38367	-77616	41009	5409
43	41140	1891	120516	84916
44	-44044	87075	-135036	170100
45	47081	-95175	-43911	-194400
46	-50255	2161	53425	-97064
47	53568	105984	157248	6759
48	-57024	-115200	-174528	117351
49	60625	2449	-56879	235000
50	-64375	127449	68121	-265000

```
Table[{n, aa = (Abs[tri2a[n, 2, p]] - Abs[tri2a[n - 1, 2, p]]), bb =  
      aa - (Abs[tri2a[n - 1, 2, p]] - Abs[tri2a[n - 2, 2, p]])}, {n, 1, 50}] /. p -> 3 // TableForm
```

1	1	1
2	6	5
3	13	7
4	24	11
5	37	13
6	54	17
7	73	19
8	96	23
9	121	25
10	150	29
11	181	31
12	216	35
13	253	37
14	294	41
15	337	43
16	384	47
17	433	49
18	486	53
19	541	55
20	600	59
21	661	61
22	726	65
23	793	67
24	864	71
25	937	73
26	1014	77
27	1093	79
28	1176	83
29	1261	85
30	1350	89
31	1441	91
32	1536	95
33	1633	97
34	1734	101
35	1837	103
36	1944	107
37	2053	109
38	2166	113
39	2281	115
40	2400	119
41	2521	121
42	2646	125
43	2773	127
44	2904	131
45	3037	133
46	3174	137
47	3313	139
48	3456	143
49	3601	145
50	3750	149