```
f[n_, t_] := Sum[ (-1)^(k + 1) / k (-1)^k (1 - Gamma[k, -Log[100]] / Gamma[k]), {k, 1, t}]
```

```
N[f[100, 10 000]] + Log[Log[100]] + EulerGamma
```

$30.1261 - 2.09386 \times 10^{-14}\,i$

```
N[ExpIntegralEi[Log[100]]]
```

30.1261

```
f2[n_, t_, s_] :=
 Sum[ (-1)^(k + 1) / k (-1)^k (1 - Gamma[k, -(s) Log[100]] / Gamma[k]), {k, 1, t}]
```

```
f2a[n_, t_, s_, s2_] := Sum[ (-1)^(k + 1) / k (-1)^k
    ((1 - Gamma[k, -s Log[100]] / Gamma[k]) + (1 - Gamma[k, -s2 Log[100]] / Gamma[k])), {k, 1, t}]
```

```
N[f2[100, 1000, 2]] + Log[2 Log[100]] + EulerGamma
```

$1246.14 - 1.13248 \times 10^{-9}\,i$

```
N[ExpIntegralEi[2 Log[100]]]
```

1246.14

```
N[f2[100, 1000, 3]] + Log[3 Log[100]] + EulerGamma
```

$78\,627.5 + 9.32697 \times 10^{-6}\,i$

```
N[ExpIntegralEi[3 Log[100]]]
```

78 627.5

```
N[f2a[100, 1600, ZetaZero[1], ZetaZero[-1]]] +
 Log[(ZetaZero[1] + ZetaZero[-1]) Log[100]] + EulerGamma
```

$1.88143 \times 10^{12} + 0.\,i$

```
N[ExpIntegralEi[(ZetaZero[1]) Log[100]] + ExpIntegralEi[(ZetaZero[-1]) Log[100]]]
```

$0.232873 + 0.\,i$

```
N[ZetaZero[1]]
```

$0.5 + 14.1347\,i$

```
Table[ {k, N[(-1)^(k + 1) / k (-1)^k (1 - Gamma[k, -(s) Log[100]] / Gamma[k])]}, {k, 1, 200}] /.
  s → ZetaZero[1] // TableForm
```

1	$-7.36665 + 7.71141\,i$
2	$254.625 + 202.189\,i$
3	$4274.85 - 5622.11\,i$
4	$-92\,840.2 - 67\,705.8\,i$
5	$-856\,579. + 1.22546 \times 10^{6}\,i$
6	$1.34688 \times 10^{7} + 9.01724 \times 10^{6}\,i$
7	$8.12342 \times 10^{7} - 1.26785 \times 10^{8}\,i$
8	$-1.04346 \times 10^{9} - 6.39257 \times 10^{8}\,i$
9	$-4.46347 \times 10^{9} + 7.62791 \times 10^{9}\,i$
10	$5.01481 \times 10^{10} + 2.79944 \times 10^{10}\,i$
11	$1.59284 \times 10^{11} - 2.99498 \times 10^{11}\,i$
12	$-1.63845 \times 10^{12} - 8.28913 \times 10^{11}\,i$
13	$-3.97218 \times 10^{12} + 8.26807 \times 10^{12}\,i$
14	$3.8716 \times 10^{13} + 1.76284 \times 10^{13}\,i$

15 $7.28079 \times 10^{13} - 1.69089 \times 10^{14}\ i$

16 $-6.91863 \times 10^{14} - 2.81016 \times 10^{14}\ i$

17 $-1.01724 \times 10^{15} + 2.6626 \times 10^{15}\ i$

18 $9.67121 \times 10^{15} + 3.46407 \times 10^{15}\ i$

19 $1.11263 \times 10^{16} - 3.32577 \times 10^{16}\ i$

20 $-1.08579 \times 10^{17} - 3.37805 \times 10^{16}\ i$

21 $-9.71189 \times 10^{16} + 3.37388 \times 10^{17}\ i$

22 $1.00008 \times 10^{18} + 2.64764 \times 10^{17}\ i$

23 $6.85063 \times 10^{17} - 2.83372 \times 10^{18}\ i$

24 $-7.68993 \times 10^{18} - 1.68303 \times 10^{18}\ i$

25 $-3.92494 \times 10^{18} + 2.00209 \times 10^{19}\ i$

26 $5.00887 \times 10^{19} + 8.67891 \times 10^{18}\ i$

27 $1.81527 \times 10^{19} - 1.20595 \times 10^{20}\ i$

28 $-2.79804 \times 10^{20} - 3.57537 \times 10^{19}\ i$

29 $-6.57831 \times 10^{19} + 6.26418 \times 10^{20}\ i$

30 $1.3548 \times 10^{21} + 1.11368 \times 10^{20}\ i$

31 $1.68105 \times 10^{20} - 2.83381 \times 10^{21}\ i$

32 $-5.73854 \times 10^{21} - 2.08571 \times 10^{20}\ i$

33 $-1.49235 \times 10^{20} + 1.12613 \times 10^{22}\ i$

34 $2.14353 \times 10^{22} - 2.14032 \times 10^{20}\ i$

35 $-1.32262 \times 10^{21} - 3.96094 \times 10^{22}\ i$

36 $-7.11126 \times 10^{22} + 4.05299 \times 10^{21}\ i$

37 $1.00329 \times 10^{22} + 1.24139 \times 10^{23}\ i$

38 $2.10859 \times 10^{23} - 2.2119 \times 10^{22}\ i$

39 $-4.50784 \times 10^{22} - 3.48738 \times 10^{23}\ i$

40 $-5.61966 \times 10^{23} + 8.65083 \times 10^{22}\ i$

41 $1.58 \times 10^{23} + 8.8286 \times 10^{23}\ i$

42 $1.353 \times 10^{24} - 2.76517 \times 10^{23}\ i$

43 $-4.65888 \times 10^{23} - 2.0238 \times 10^{24}\ i$

44 $-2.95617 \times 10^{24} + 7.58253 \times 10^{23}\ i$

45 $1.19521 \times 10^{24} + 4.21893 \times 10^{24}\ i$

46 $5.88562 \times 10^{24} - 1.82836 \times 10^{24}\ i$

47 $-2.71885 \times 10^{24} - 8.02967 \times 10^{24}\ i$

48 $-1.07178 \times 10^{25} + 3.93567 \times 10^{24}\ i$

49 $5.55229 \times 10^{24} + 1.40022 \times 10^{25}\ i$

50 $1.79118 \times 10^{25} - 7.6417 \times 10^{24}\ i$

51 $-1.02698 \times 10^{25} - 2.24439 \times 10^{25}\ i$

52 $-2.75566 \times 10^{25} + 1.34875 \times 10^{25}\ i$

53 $1.73225 \times 10^{25} + 3.31644 \times 10^{25}\ i$

54 $3.91359 \times 10^{25} - 2.17712 \times 10^{25}\ i$

55 $-2.6792 \times 10^{25} - 4.52972 \times 10^{25}\ i$

56 $-5.1438 \times 10^{25} + 3.23009 \times 10^{25}\ i$

57 $3.8171 \times 10^{25} + 5.73239 \times 10^{25}\ i$

58 $6.27103 \times 10^{25} - 4.42349 \times 10^{25}\ i$

59 $-5.02922 \times 10^{25} - 6.73597 \times 10^{25}\ i$

60 $-7.10591 \times 10^{25} + 5.61202 \times 10^{25}\ i$

61 $6.14882 \times 10^{25} + 7.36363 \times 10^{25}\ i$

62 $7.49729 \times 10^{25} - 6.61723 \times 10^{25}\ i$

63 $-6.99721\times10^{25}-7.50128\times10^{25}\,i$
64 $-7.37666\times10^{25}+7.27247\times10^{25}\,i$
65 $7.43161\times10^{25}+7.13086\times10^{25}\,i$
66 $6.77703\times10^{25}-7.46895\times10^{25}\,i$
67 $-7.38474\times10^{25}-6.33288\times10^{25}\,i$
68 $-5.81924\times10^{25}+7.18505\times10^{25}\,i$
69 $6.88109\times10^{25}+5.25852\times10^{25}\,i$
70 $4.67315\times10^{25}-6.48823\times10^{25}\,i$
71 $-6.02481\times10^{25}-4.08422\times10^{25}\,i$
72 $-3.51033\times10^{25}+5.51071\times10^{25}\,i$
73 $4.96613\times10^{25}+2.96687\times10^{25}\,i$
74 $2.46552\times10^{25}-4.41029\times10^{25}\,i$
75 $-3.86052\times10^{25}-2.01418\times10^{25}\,i$
76 $-1.61719\times10^{25}+3.3315\times10^{25}\,i$
77 $2.83488\times10^{25}+1.27569\times10^{25}\,i$
78 $9.88211\times10^{24}-2.37908\times10^{25}\,i$
79 $-1.96944\times10^{25}-7.51287\times10^{24}\,i$
80 $-5.60088\times10^{24}+1.60847\times10^{25}\,i$
81 $1.29625\times10^{25}+4.09\times10^{24}\,i$
82 $2.92118\times10^{24}-1.03096\times10^{25}\,i$
83 $-8.09364\times10^{24}-2.03639\times10^{24}\,i$
84 $-1.38152\times10^{24}+6.27274\times10^{24}\,i$
85 $4.80006\times10^{24}+9.08175\times10^{23}\,i$
86 $5.74631\times10^{23}-3.62723\times10^{24}\,i$
87 $-2.70707\times10^{24}-3.46099\times10^{23}\,i$
88 $-1.94435\times10^{23}+1.99564\times10^{24}\,i$
89 $1.45336\times10^{24}+9.75338\times10^{22}\,i$
90 $3.85186\times10^{22}-1.04576\times10^{24}\,i$
91 $-7.43539\times10^{23}-4.8693\times10^{21}\,i$
92 $1.24333\times10^{22}+5.2245\times10^{23}\,i$
93 $3.62829\times10^{23}-1.96878\times10^{22}\,i$
94 $-2.11456\times10^{22}-2.49069\times10^{23}\,i$
95 $-1.69023\times10^{23}+1.9567\times10^{22}\,i$
96 $1.66613\times10^{22}+1.13402\times10^{23}\,i$
97 $7.5229\times10^{22}-1.34232\times10^{22}\,i$
98 $-1.03809\times10^{22}-4.93493\times10^{22}\,i$
99 $-3.20144\times10^{22}+7.77198\times10^{21}\,i$
100 $5.66371\times10^{21}+2.05406\times10^{22}\,i$
101 $1.30352\times10^{22}-4.03225\times10^{21}\,i$
102 $-2.81201\times10^{21}-8.18259\times10^{21}\,i$
103 $-5.08117\times10^{21}+1.92469\times10^{21}\,i$
104 $1.29488\times10^{21}+3.1215\times10^{21}\,i$
105 $1.89721\times10^{21}-8.57305\times10^{20}\,i$
106 $-5.59102\times10^{20}-1.14089\times10^{21}\,i$
107 $-6.78839\times10^{20}+3.59446\times10^{20}\,i$
108 $2.27952\times10^{20}+3.99674\times10^{20}\,i$
109 $2.32849\times10^{20}-1.42679\times10^{20}\,i$
110 $-8.81831\times10^{19}-1.34241\times10^{20}\,i$

111 $-7.65855 \times 10^{19} + 5.38391 \times 10^{19}\,i$
112 $3.24827 \times 10^{19} + 4.3238 \times 10^{19}\,i$
113 $2.41569 \times 10^{19} - 1.93725 \times 10^{19}\,i$
114 $-1.14241 \times 10^{19} - 1.33559 \times 10^{19}\,i$
115 $-7.30718 \times 10^{18} + 6.66296 \times 10^{18}\,i$
116 $3.84437 \times 10^{18} + 3.95603 \times 10^{18}\,i$
117 $2.11924 \times 10^{18} - 2.19475 \times 10^{18}\,i$
118 $-1.24002 \times 10^{18} - 1.12327 \times 10^{18}\,i$
119 $-5.89027 \times 10^{17} + 6.93483 \times 10^{17}\,i$
120 $3.8395 \times 10^{17} + 3.05552 \times 10^{17}\,i$
121 $1.56774 \times 10^{17} - 2.10481 \times 10^{17}\,i$
122 $-1.14264 \times 10^{17} - 7.95473 \times 10^{16}\,i$
123 $-3.99072 \times 10^{16} + 6.14364 \times 10^{16}\,i$
124 $3.272 \times 10^{16} + 1.97895 \times 10^{16}\,i$
125 $9.69697 \times 10^{15} - 1.72632 \times 10^{16}\,i$
126 $-9.02405 \times 10^{15} - 4.69332 \times 10^{15}\,i$
127 $-2.24258 \times 10^{15} + 4.67408 \times 10^{15}\,i$
128 $2.39911 \times 10^{15} + 1.05722 \times 10^{15}\,i$
129 $4.91346 \times 10^{14} - 1.2204 \times 10^{15}\,i$
130 $-6.15306 \times 10^{14} - 2.24884 \times 10^{14}\,i$
131 $-1.01226 \times 10^{14} + 3.07508 \times 10^{14}\,i$
132 $1.52345 \times 10^{14} + 4.47302 \times 10^{13}\,i$
133 $1.9355 \times 10^{13} - 7.48248 \times 10^{13}\,i$
134 $-3.64364 \times 10^{13} - 8.17183 \times 10^{12}\,i$
135 $-3.34866 \times 10^{12} + 1.75926 \times 10^{13}\,i$
136 $8.42284 \times 10^{12} + 1.32067 \times 10^{12}\,i$
137 $4.94089 \times 10^{11} - 3.99895 \times 10^{12}\,i$
138 $-1.88287 \times 10^{12} - 1.70489 \times 10^{11}\,i$
139 $-5.07341 \times 10^{10} + 8.79236 \times 10^{11}\,i$
140 $4.07216 \times 10^{11} + 1.01599 \times 10^{10}\,i$
141 $-1.45554 \times 10^{9} - 1.87068 \times 10^{11}\,i$
142 $-8.52417 \times 10^{10} + 3.45727 \times 10^{9}\,i$
143 $2.83017 \times 10^{9} + 3.85301 \times 10^{10}\,i$
144 $1.72768 \times 10^{10} - 1.84062 \times 10^{9}\,i$
145 $-1.07503 \times 10^{9} - 7.68524 \times 10^{9}\,i$
146 $-3.39155 \times 10^{9} + 5.88657 \times 10^{8}\,i$
147 $3.08363 \times 10^{8} + 1.48491 \times 10^{9}\,i$
148 $6.45023 \times 10^{8} - 1.56265 \times 10^{8}\,i$
149 $-7.71284 \times 10^{7} - 2.77994 \times 10^{8}\,i$
150 $-1.18875 \times 10^{8} + 3.72445 \times 10^{7}\,i$
151 $1.76504 \times 10^{7} + 5.04368 \times 10^{7}\,i$
152 $2.12331 \times 10^{7} - 8.22736 \times 10^{6}\,i$
153 $-3.77844 \times 10^{6} - 8.86937 \times 10^{6}\,i$
154 $-3.6761 \times 10^{6} + 1.71186 \times 10^{6}\,i$
155 $765\,900. + 1.51181 \times 10^{6}\,i$
156 $616\,911. - 338\,669.\,i$
157 $-148\,105. - 249\,779.\,i$
158 $-100\,344. + 64\,090.4\,i$

```
159    27 456.8 + 39 995.7 i
160    15 816.6 - 11 649.6 i
161    -4896.92 - 6205.39 i
162    -2415.24 + 2039.93 i
163    842.358 + 932.51 i
164    357.117 - 344.887 i
165    -140.039 - 135.647 i
166    -51.1014 + 56.3956 i
167    22.5254 + 19.0841 i
168    7.06058 - 8.93145 i
169    -3.51915 - 2.5936 i
170    -0.949199 + 1.3715 i
171    0.525572 + 0.339897 i
172    0.115475 - 0.204398 i
173    -0.0838266 - 0.0428453 i
174    -0.0207221 + 0.0295872 i
175    0.00542271 + 0.00517527 i
176    -0.00391473 - 0.00416271 i
177    -0.00719482 - 0.000595526 i
178    -0.0058158 + 0.000569565 i
179    -0.00537807 + 0.0000646616 i
180    -0.00553481 - 0.0000758275 i
181    -0.00555225 - 6.51196 × 10^-6 i
182    -0.0054965 + 9.82688 × 10^-6 i
183    -0.00546098 + 5.87169 × 10^-7 i
184    -0.00543462 - 1.24016 × 10^-6 i
185    -0.00540584 - 4.32001 × 10^-8 i
186    -0.00537635 + 1.52458 × 10^-7 i
187    -0.00534754 + 1.65482 × 10^-9 i
188    -0.00531915 - 1.82626 × 10^-8 i
189    -0.00529101 + 2.2713 × 10^-10 i
190    -0.00526316 + 2.13211 × 10^-9 i
191    -0.0052356 - 7.51998 × 10^-11 i
192    -0.00520833 - 2.42648 × 10^-10 i
193    -0.00518135 + 1.40416 × 10^-11 i
194    -0.00515464 + 2.69229 × 10^-11 i
195    -0.00512821 - 2.16606 × 10^-12 i
196    -0.00510204 - 2.91263 × 10^-12 i
197    -0.00507614 + 3.00757 × 10^-13 i
198    -0.00505051 + 3.07244 × 10^-13 i
199    -0.00502513 - 3.88763 × 10^-14 i
200    -0.005 - 3.16011 × 10^-14 i
```

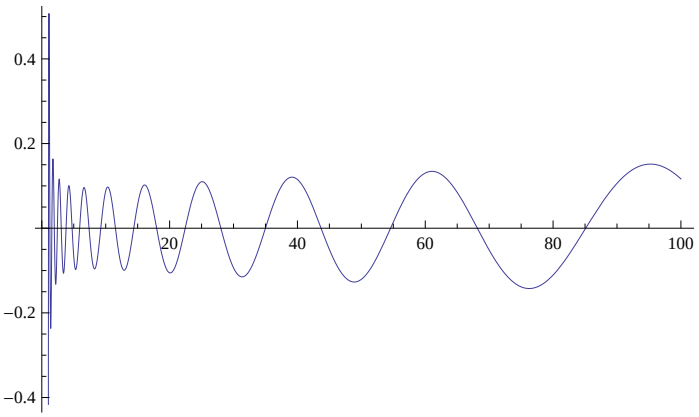
```
FullSimplify[f2a[100, 200, ZetaZero[1], ZetaZero[-1]] +
  Log[(ZetaZero[1] + ZetaZero[-1]) Log[100]] + EulerGamma]
```

```
$Aborted
```

```
Limit[( - (-1)^z Gamma[z, -(ZetaZero[1]) Log[n]] / Gamma[z]) / z, z → 0]
```

```
-Gamma[0, -Log[n] ZetaZero[1]]
```

```
Plot[ Re[-Gamma[0, -Log[n] ZetaZero[1]]], {n, 1, 100}]
```




```
Limit[( - (-1)^z Gamma[z, -Log[n]] / Gamma[z]) / z, z → 1]
```

n

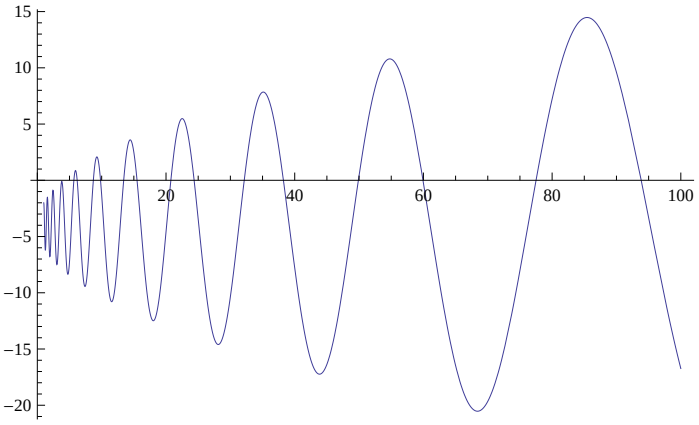
```
Limit[( (-1)^z - (-1)^z Gamma[z, -(ZetaZero[1]) Log[n]] / Gamma[z] - 1) / z, z → 1]
```

$-2 + n^{\text{ZetaZero}[1]}$

```
Limit[( - (-1)^z Gamma[z, -(ZetaZero[-1]) Log[n]] / Gamma[z]) / z, z → 1]
```

$n^{\text{ZetaZero}[-1]}$

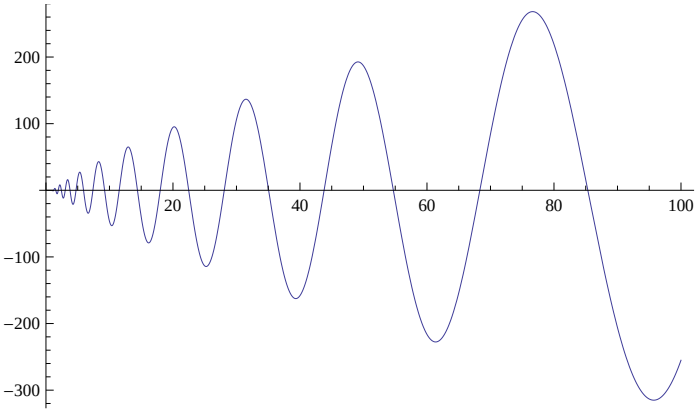
```
Plot[ n^ZetaZero[1] + n^ZetaZero[-1] - 4, {n, 1, 100}]
```



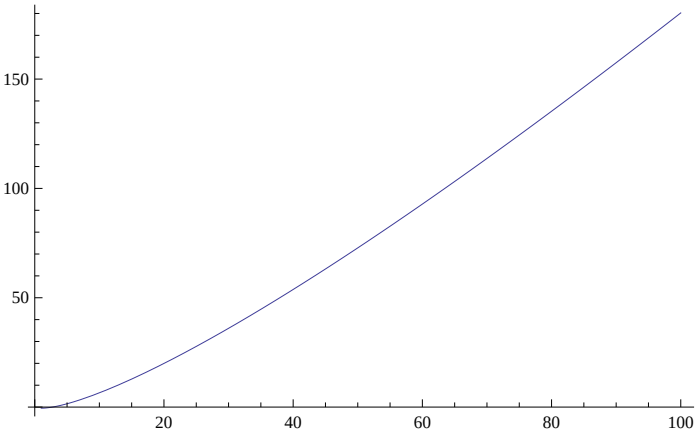

```
Limit[( (-1)^z - (-1)^z Gamma[z, -(ZetaZero[1]) Log[n]] / Gamma[z] - 1) / z, z → 2]
```

$-\frac{1}{2}\,\text{Gamma}[2, -\text{Log}[n]\,\text{ZetaZero}[1]]$

```
Plot[ Re[-1/2 Gamma[2, -Log[n] ZetaZero[1]]], {n, 1, 100}]
```




```
Plot[ Re[-1/2 Gamma[2, -Log[n] ]], {n, 1, 100}]
```




```
ff[n_, t_] := n - Sum[ n^ZetaZero[k] + n^ZetaZero[-k] + 2, {k, 1, 200}]
N[ff[1000, 60]]
```

$218.909 - 5.68434 \times 10^{-14}\, i$

```
DiscretePlot[Re[ff[n, 50]], {n, 1, 100}]
```