```
Dd[n_, 0, a_] := 1; Dd[n_, 1, a_] := Floor[n] - a + 1
Dd[n_, k_, a_] :=
 Dd[n, k, a] = Sum[Binomial[k, j] Dd[n / (m^(k - j)), j, m + 1], {m, a, n^(1 / k)}, {j, 0, k - 1}]
P2[n_, j_] := P2[n, j] =
  Sum[1 / k! (D[Log[1 + x]^j, {x, k}] /. x → 0) Dd[n, k, 2], {k, 0, Log[2, n]}]
DAlt[x_, z_] := Sum[z^k / k! P2[x, k], {k, 0, Log[2, x]}]
cs[x_, z_] := Sum[(D[Cos[r], {r, k}] /. r → 0) / k! P2[x, k], {k, 0, Log[2, x]}]
sn[x_, z_] := Sum[(D[Sin[r], {r, k}] /. r → 0) / k! P2[x, k], {k, 0, Log[2, x]}]
cssq[x_, z_] := Sum[(D[Cos[r]^2, {r, k}] /. r → 0) / k! P2[x, k], {k, 0, Log[2, x]}]
snsq[x_, z_] := Sum[(D[Sin[r]^2, {r, k}] /. r → 0) / k! P2[x, k], {k, 0, Log[2, x]}]
```

```
DAlt[100, I]
```

$$-\frac{2881}{72}+\frac{65\,i}{8}$$

```
D[Cos[x], {x, 6}] /. x → 0
```

$$-1$$

```
cs[100, 1] + I sn[100, 1]
```

$$-\frac{2881}{72}+\frac{65\,i}{8}$$

```
cssq[100, 1] + snsq[100, 1]
```

$$1$$

```
DAlt[100, x]
```

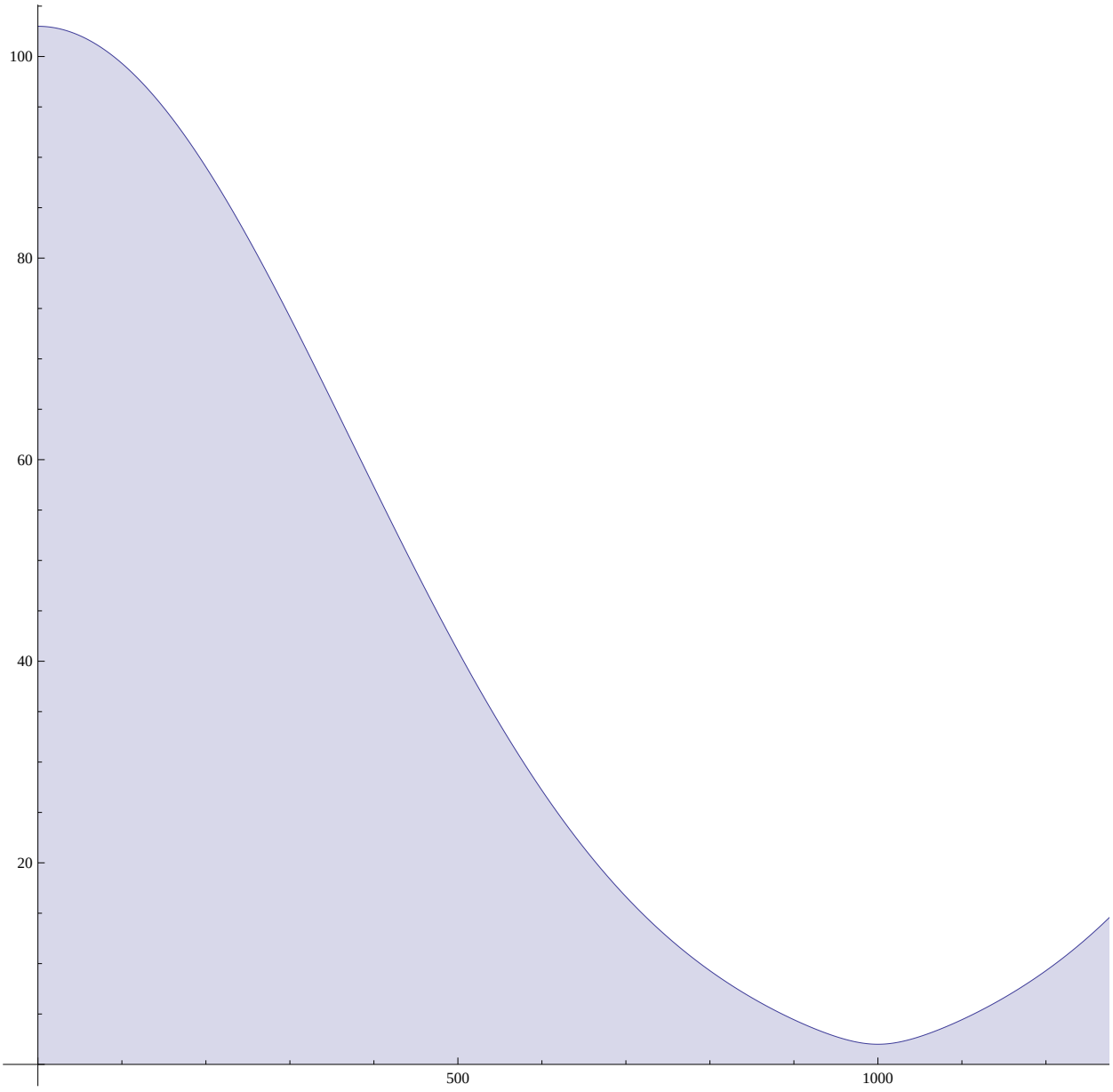
$$1+\frac{428\,x}{15}+\frac{16\,289\,x^2}{360}+\frac{331\,x^3}{16}+\frac{611\,x^4}{144}+\frac{67\,x^5}{240}+\frac{7\,x^6}{720}$$

```
ddd[n_, r_, j_, c_] := DAlt[n, r (Cos[2 Pi j / c] + I Sin[2 Pi j / c])]
ddd2[n_, r_, j_, c_] :=
 (DAlt[n, r (Cos[2 Pi j / c] + I Sin[2 Pi j / c])] - 1) / (r (Cos[2 Pi j / c] + I Sin[2 Pi j / c]))
ff[n_, r_, c_] := Sum[(1 / c) DAlt[n, r (Cos[2 Pi j / c] + I Sin[2 Pi j / c])], {j, 0, c - 1}]
ffp[n_, r_, c_] := Sum[(1 / c) ddd2[n, r, j, c], {j, 0, c - 1}]
ff2[n_, r_, c_] :=
 DiscretePlot[{Re[ddd2[n, r, j, c]], Im[ddd2[n, r, j, c]]}, {j, 0, c - 1}]
ffa[n_, r_, c_] := DiscretePlot[{Re[ddd[n, r, j, c]], Im[ddd[n, r, j, c]]}, {j, 0, c - 1}]
ffb[n_, r_, c_] := DiscretePlot[{Abs[ddd[n, r, j, c]]}, {j, 0, c - 1}]
```

```
ffp[100, 1, 4.]
```

$$28.8125+1.77636\times10^{-15}\,i$$

```
ffb[103, 1, 2000.]
```



```
DAlt[100 000, z]
```

$$1+\frac{991\,892\,879\,z}{102\,960}+\frac{16\,611\,877\,533\,197\,z^2}{605\,404\,800}+\frac{27\,613\,425\,421\,567\,z^3}{864\,864\,000}+$$
$$\frac{8\,883\,298\,064\,606\,291\,z^4}{435\,891\,456\,000}+\frac{82\,938\,597\,121\,z^5}{10\,264\,320}+\frac{12\,123\,475\,378\,339\,z^6}{5\,748\,019\,200}+\frac{987\,114\,594\,581\,z^7}{2\,612\,736\,000}+$$
$$\frac{6\,832\,898\,553\,167\,z^8}{146\,313\,216\,000}+\frac{53\,237\,749\,z^9}{13\,063\,680}+\frac{1\,772\,592\,397\,z^{10}}{7\,315\,660\,800}+\frac{20\,466\,961\,z^{11}}{2\,052\,864\,000}+$$
$$\frac{30\,323\,737\,z^{12}}{114\,960\,384\,000}+\frac{841\,z^{13}}{186\,810\,624}+\frac{9773\,z^{14}}{209\,227\,898\,880}+\frac{71\,z^{15}}{373\,621\,248\,000}+\frac{17\,z^{16}}{20\,922\,789\,888\,000}$$

```
1 + 991 892 879 z/102 960 + 16 611 877 533 197 z^2/605 404 800 + 27 613 425 421 567 z^3/864 864 000 +
  8 883 298 064 606 291 z^4/435 891 456 000 + 82 938 597 121 z^5/10 264 320 + 12 123 475 378 339 z^6/5 748 019 200 + 987 114 594 581 z^7/2 612 736 000 +
  6 832 898 553 167 z^8/146 313 216 000 + 53 237 749 z^9/13 063 680 + 1 772 592 397 z^10/7 315 660 800 + 20 466 961 z^11/2 052 864 000 +
  30 323 737 z^12/114 960 384 000 + 841 z^13/186 810 624 + 9773 z^14/209 227 898 880 + 71 z^15/373 621 248 000 + 17 z^16/20 922 789 888 000 /. z → I
```

$$-\frac{7\,340\,179\,524\,487}{804\,722\,688}-\frac{209\,626\,633\,781\,i}{14\,370\,048}$$

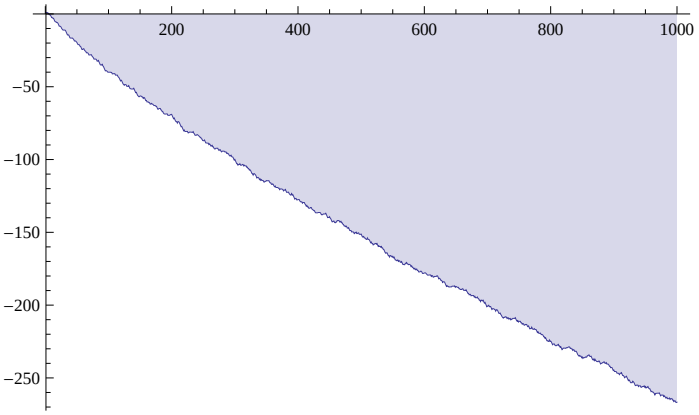
```
DAlt[100, I]
```

$$-\frac{2881}{72}+\frac{65\,i}{8}$$

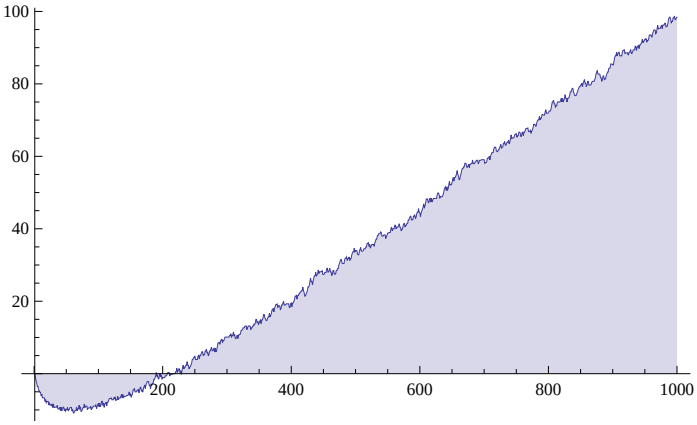
```
Integrate[ E^z , {z, 0, 1}]
```

$$-1+e$$

```
DiscretePlot[ Re[ DAlt[ n, -I]], {n, 1, 1000}]
```




```
DiscretePlot[ Im[ DAlt[ n, -I]], {n, 1, 1000}]
```




```
DiscretePlot[Abs[DAlt[n, -I]], {n, 1, 1000}]
```