

```
b0 := N[11 / (4 * Pi) ^ 2]
```

```
b1 := N[102 / (4 * Pi) ^ 4]
```

```
b2 := N[2857 / 2 / (4 * Pi) ^ 6]
```

```
b3 := N[(149753 / 6 + 3564 * Zeta[3]) / (4 * Pi) ^ 8]
```

```
bee[x_] := -b0 * x ^ 3 - b1 * x ^ 5 - b2 * x ^ 7 - b3 * x ^ 9
```

```
bee[x]
```

```
-0.0696583 x^3 - 0.00409035 x^5 - 0.000362761 x^7 - 0.0000470265 x^9
```

```
MoL := Exp[1 / 2 / b0 / g ^ 2] * (b0 * g ^ 2) ^ (b1 / 2 / b0 ^ 2) *  
Exp[Integrate[1 / bee[z] + 1 / b0 / z ^ 3 - b1 / b0 ^ 2 / z, {z, 0, g}]]
```

```
MoL
```

```
Integrate::idiv :
```

```
Integral of  $\frac{14.3558}{z^3} - \frac{0.842975}{z} + 1 / (-0.0696583z^3 - 0.00409035z^5 - 0.000362761z^7 - 0.0000470265z^9)$ 
```

```
does not converge on {0, g}. Mehr...
```

```
0.325332 e  $\frac{7.17789}{g^2} + \int_0^g \left( \frac{14.3558}{z^3} - \frac{0.842975}{z} + \frac{1}{-0.0696583z^3 - 0.00409035z^5 - 0.000362761z^7 - 0.0000470265z^9} \right) dz$  (g^2)^{0.421488}
```

```
FindRoot[MoL == 14, {g, 1}]
```

```
∞::indet : Indeterminate expression 0 ComplexInfinity encountered. Mehr...
```

```
{g -> 1.44869 + 0. i}
```

```
Plot[MoL, {g, 0.9, 2}]
```

```
∞::indet : Indeterminate expression 0 ComplexInfinity encountered. Mehr...
```

```
∞::indet : Indeterminate expression 0 ComplexInfinity encountered. Mehr...
```

```
∞::indet : Indeterminate expression 0 ComplexInfinity encountered. Mehr...
```

```
General::stop : Further output of ∞::indet will be suppressed during this calculation. Mehr...
```

```
$RecursionLimit::reclim : Recursion depth of 256 exceeded. Mehr...
```

```
$RecursionLimit::reclim : Recursion depth of 256 exceeded. Mehr...
```

```
$RecursionLimit::reclim : Recursion depth of 256 exceeded. Mehr...
```

```
General::stop :
```

```
Further output of $RecursionLimit::reclim will be suppressed during this calculation. Mehr...
```

```
d0 := -1 / (4 * Pi) ^ 2 * 64 / 9
```

```
d1 := -1 / (4 * Pi) ^ 4 * 23488 / 243
```

```
d2 := -1 / (4 * Pi) ^ 6 * (11028416 / 6561 + 2560 / 81 * Zeta[3])
```

```
gamma[x_] := d0 * x ^ 2 + d1 * x ^ 4 + d2 * x ^ 6
```

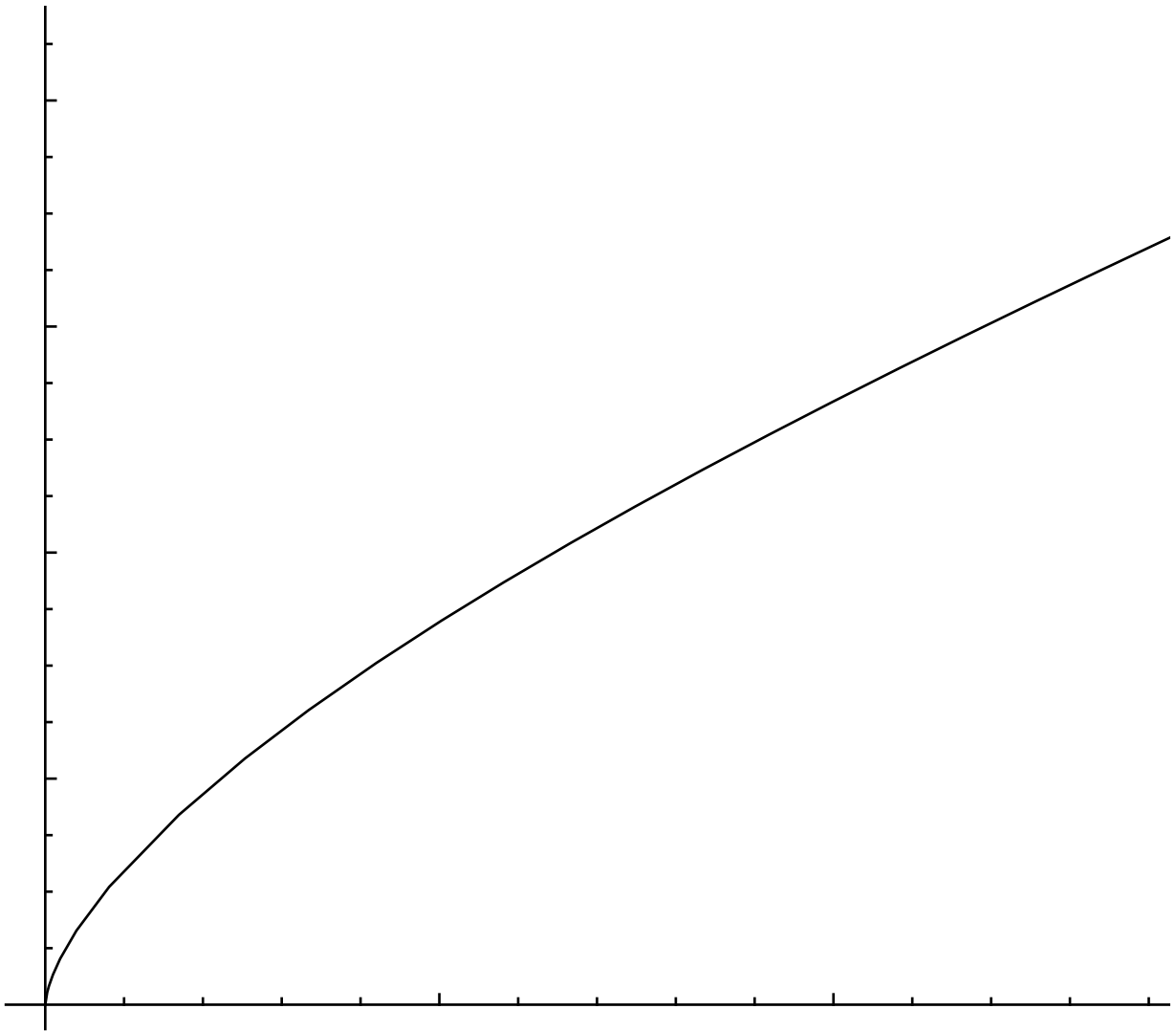
```
ID[x_] := x
```

```
Zi[g_] :=  
(2 * b0 * g ^ 2) ^ (-d0 / 2 / b0) * Exp[Integrate[gamma[x] / bee[x] + d0 / b0 / x, {x, 0, g}]]
```

```
N[Zi[0.1]]
```

```
0.119368 + 0. i
```

```
Plot[Zi[g], {g, 0, 2}]
```



- Graphics -

```

e0 := 1 / (4 * Pi) ^ 2 * 4 / 9
e1 := 1 / (4 * Pi) ^ 4 * (363 604 / 3645 - 1024 / 15 * Zeta[3])
ee[g_] := 1 + e0 * g ^ 2 + e1 * g ^ 4

ee[g] /. FindRoot[MoL == 100, {g, 1}]

1.00476

Zi[g] /. FindRoot[MoL == 4, {g, 1}]

FindRoot::nlnum : The function value {-4. + MoL}
is not a list of numbers with dimensions {1} at {g} = {1.}. Mehr...

ReplaceAll::reps :
{FindRoot[MoL == 4, {g, 1}]} is neither a list of replacement rules nor a valid
dispatch table, and so cannot be used for replacing. Mehr...

Zi[g] /. FindRoot[MoL == 4, {g, 1}]

For[M = 2, M < 100, M = M * 1.1, gM = FindRoot[MoL == M, {g, 1}];
Print[M, " ", ID[g] /. gM, " ", Zi[g] /. gM, " ", ee[g] /. gM]]

2 2.79116 1.11656 1.06499
2.2 2.57519 1.04602 1.04987
2.42 2.41415 0.994104 1.0405
2.662 2.28656 0.953295 1.03411
2.9282 2.1814 0.919823 1.02946
3.22102 2.09232 0.891541 1.02592
3.54312 2.0153 0.867117 1.02313
3.89743 1.94764 0.845667 1.02089
4.28718 1.88747 0.826577 1.01903
4.7159 1.83339 0.809403 1.01748
5.18748 1.78437 0.793813 1.01615
5.70623 1.73963 0.779555 1.01502
6.27686 1.69853 0.766431 1.01403
6.90454 1.66057 0.754283 1.01316
7.595 1.62535 0.742985 1.01239
8.3545 1.59254 0.732432 1.0117
9.18995 1.56185 0.722539 1.01109
10.1089 1.53306 0.713231 1.01053
11.1198 1.50597 0.704449 1.01003
12.2318 1.4804 0.69614 1.00958
13.455 1.45622 0.688259 1.00916
14.8005 1.43329 0.680767 1.00878

```

```

16.2805 1.41151 0.673629 1.00842
17.9086 1.39078 0.666818 1.0081
19.6995 1.37101 0.660305 1.0078
21.6694 1.35213 0.654068 1.00752
23.8364 1.33407 0.648086 1.00726
26.22 1.31677 0.64234 1.00701
28.842 1.30018 0.636814 1.00679
31.7262 1.28424 0.631494 1.00657
34.8988 1.26892 0.626365 1.00637
38.3887 1.25417 0.621415 1.00618
42.2276 1.23995 0.616634 1.006
46.4503 1.22625 0.612011 1.00584
51.0953 1.21301 0.607536 1.00568
56.2049 1.20022 0.603202 1.00553
61.8254 1.18786 0.599 1.00538
68.0079 1.17589 0.594923 1.00525
74.8087 1.16429 0.590965 1.00512
82.2896 1.15305 0.58712 1.005
90.5185 1.14215 0.583381 1.00488
99.5704 1.13157 0.579744 1.00477

```

```
FindRoot[MoL == 0.34047314 * 10, {g, 1}]
```

```
{g → 2.04623}
```

```
Zeta[5.0000]
```

```
1.03693
```

```
Zi[1.26757]
```

```
0.625914 + 0. i
```