```
(*Self-Adjoint Wheeler-deWitt equation for the third ordering:*)
(*-y''[Q]+((8πρQ)/3 -3/(16Q^2))y[Q]==k y[Q]*)
(*For negative Q , ρ=0, and for k=0, this becomes:*)
```

In[•]:=
```
DSolve[-y''[Q] - (3 / (16 Q^2)) y[Q] == 0, y[Q], Q]
```

Out[•]=

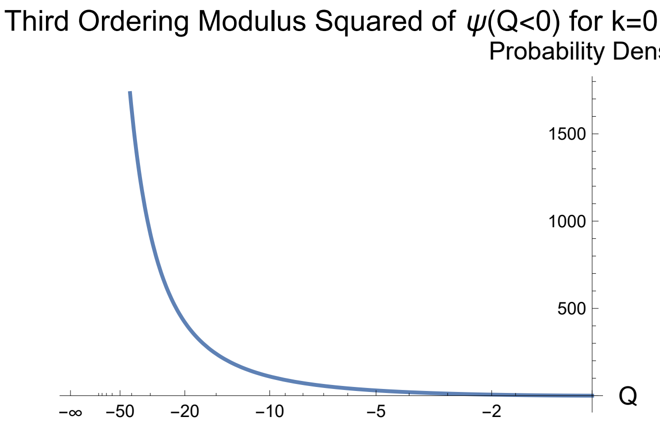
$$\left\{\left\{y[Q] \to Q^{1/4}\, c_1 + Q^{3/4}\, c_2\right\}\right\}$$

```
(* This solution times Q^(1/4) gives the solution to the WdW equation,
and hence is equal to: *)
```

In[•]:=
```
WdWsolutionzerok3rd[Q_, α_, β_] :=
 Q^(1/2) α + Q β
```

In[•]:=
```
(*The limit as Q→ -Infinity is -Infinity regardless of α/β choices*)
Plot[Abs[WdWsolutionzerok3rd[Q, 1, 1]]^2, {Q, -Infinity, 0},
 AxesLabel → {Style["Q", Black, 13], Style["Probability Density", Black, 13]},
 PlotLabel → Style["Third Ordering Modulus Squared of ψ(Q<0) for k=0", Black, 15],
 AxesStyle → Directive[Black, Thickness[0.0009]]]
(*Now for positive Q:*)
```

Out[•]=




```
(*Self-Adjoint Wheeler-deWitt equation for the third ordering:*)
(*-y''[Q]+((8πρQ)/3 -3/(16Q^2))y[Q]==k y[Q]*)
(*For positive Q, ρ=A/Q^2 and for k=0, this becomes:*)
```

In[•]:=
```
DSolve[-y''[Q] + ((8 π × A) / (3 Q) - 3 / (16 Q^2)) y[Q] == 0, y[Q], Q]
```

Out[•]=

$$\left\{\left\{y[Q] \to e^{4\sqrt{A}\sqrt{\frac{2\pi}{3}}\sqrt{Q}}\, Q^{1/4}\, c_1 - \frac{e^{-4\sqrt{A}\sqrt{\frac{2\pi}{3}}\sqrt{Q}}\sqrt{\frac{3}{2\pi}}\, Q^{1/4}\, c_2}{4\sqrt{A}}\right\}\right\}$$

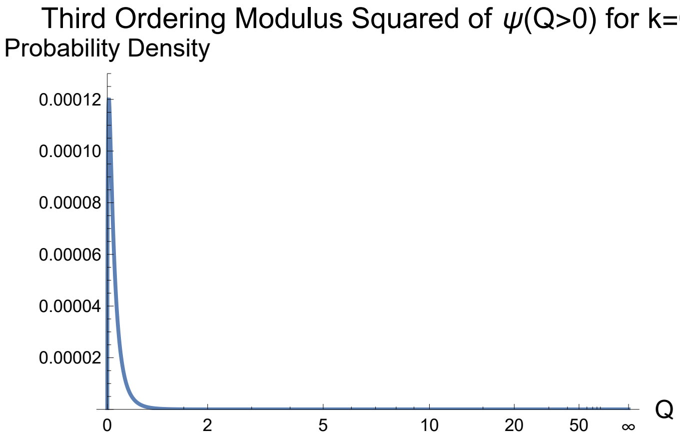
In[•]:=
```
(*Which then has to be multiplied by Q^(1/4) to become the WdW solution:*)
wdwsolutionzerokpos3[Q_, α_, β_] :=
```

$$e^{4\sqrt{A}\sqrt{\frac{2\pi}{3}}\sqrt{Q}}\, Q^{1/2}\, \alpha - \frac{e^{-4\sqrt{A}\sqrt{\frac{2\pi}{3}}\sqrt{Q}}\sqrt{\frac{3}{2\pi}}\, Q^{1/2}\, \beta}{4\sqrt{A}}$$

```
(*Now, as Q is positive and goes to infinity, if β=0,
the limit to infinity is infinity, while if α=0, the limit to infinity is 0,
if both are non-zero the limit is indeterminent, so α=0 is chosen (β=1)*)
```

In[◦]:=
```
Plot[Abs[wdwsolutionzerokpos3[Q, 0, 1]]^2 /. {A → 1},
 {Q, 0, Infinity}, PlotRange → {0, 0.00013},
 AxesLabel → {Style["Q", Black, 13], Style["Probability Density", Black, 13]},
 PlotLabel → Style["Third Ordering Modulus Squared of ψ(Q>0) for k=0", Black, 15],
 AxesStyle → Directive[Black, Thickness[0.0009]]]
```

Out[◦]=




```
(*Although the positive Q part is normalisable, the negative Q part is not,
thus it is not possible to construct a wavefunction that
 is normalisable across all Q, thus it cannot yield results.*)
```