
Sample Code which reproduces Example 3.3 of Griffiths

■ Input Functions

```
V[x_,y_,Ntot_] := Sum[c[m]*phi[x,y,m], {m,1,Ntot}]

(* This defines the potential as a function of x,y
   as sum of the "normal modes", weighed
   by the expansion coefficients where Ntot is the
   total number of terms kept in the sum *)

phi[x_,y_,m_] := Exp[-m x] Sin[m y]

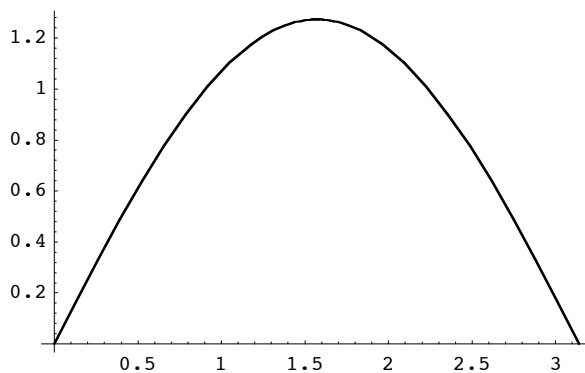
(* This defines the normal mode "m" *)

c[m_] := 2/(m Pi)*(1-Cos[m Pi])

(* This defines the expansion coefficients.
   Here I have set V0=1.
   Note, an alternative would be using Mathematica's
   "If function and testing for even and odd indices
   c[m_] := If[EvenQ[m], 0, 1] *)
```

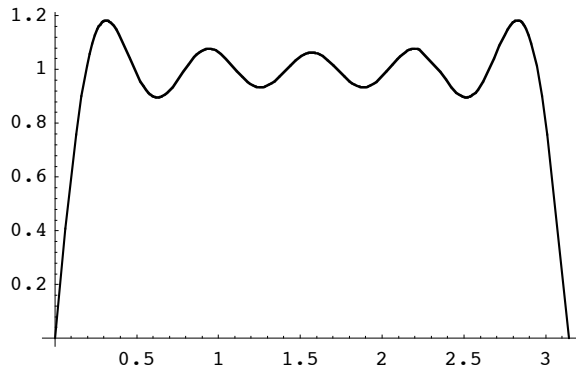
■ Plots: Here we want to show that $V(x,y)$ satisfies the boundary Condition at $x=0$ (see Griffiths, Fig. 3.18, Page 131)

```
Plot[V[0,y,2],{y,0,Pi},PlotRange->All]
(* Only 2 terms in the series *)
```



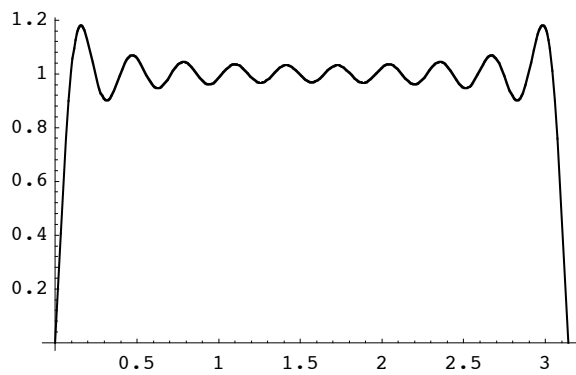
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```
Plot[V[0,y,10],{y,0,Pi},PlotRange->All]  
(* 10 terms in the series *)
```



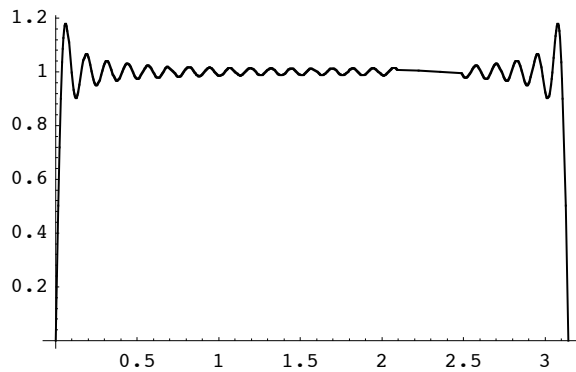
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```
Plot[V[0,y,20],{y,0,Pi},PlotRange->All]  
(* 20 terms in the series *)
```



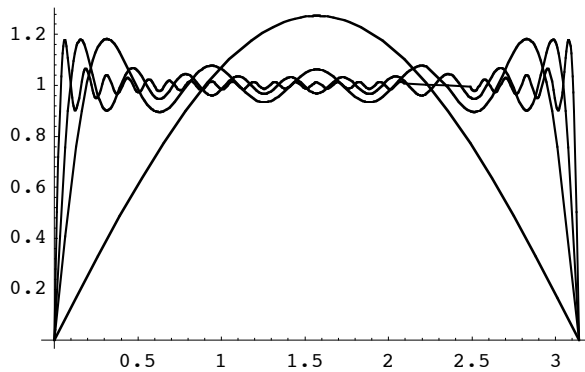
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```
Plot[V[0,y,50],{y,0,Pi},PlotRange->All]  
(* 50 terms in the series *)
```



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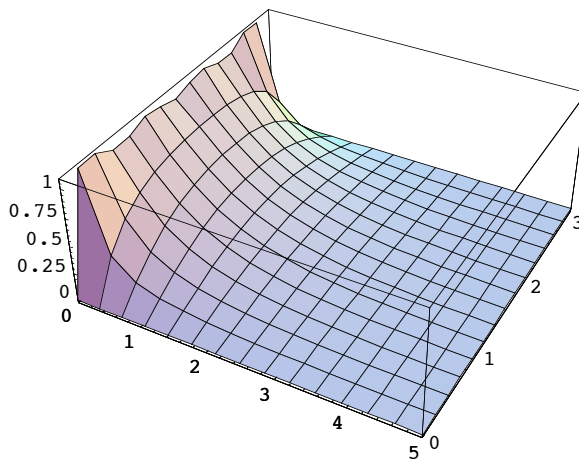
```
Show[%59,%60,%61,%62]
(* This shows how the infinite series approaches
the expected value:  $V(0,y) = 1$  (in units  $V_0$ ) *)
```



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■ Example of a three plot of $V[x,y]$

```
Plot3D[V[x,y,20],{x,0,5},{y,0,Pi},PlotRange->All]
(* 20 terms in the series *)
```



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