Physics 449 hw#1

Name: Ruojun Wang

Due: 2018/2/2 W2F

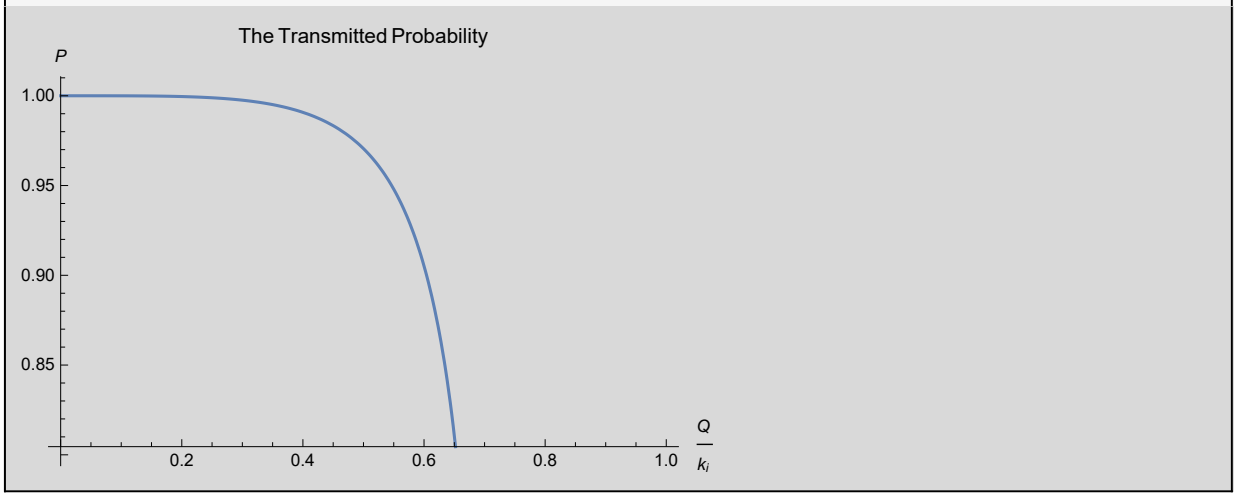
In[26]:=
```
<< "http://www.physics.wisc.edu/~tgwalker/448defs.m"
```

6) Plot the transmitted probability as a function of k_i

In[5]:=
```
AmpR = (Sqrt[1 - 2 (Qki)^2] - 1) / (-1 - Sqrt[1 - 2 (Qki)^2]); PTrans = 1 - AmpR^2;
Plot[PTrans, {Qki, 0, 1}]
```

In[8]:=
```
Show[%7, AxesLabel → {HoldForm[Q/k_i], HoldForm[HoldForm[P]]},
 PlotLabel → HoldForm[The Transmitted Probability]]
```

Out[8]=



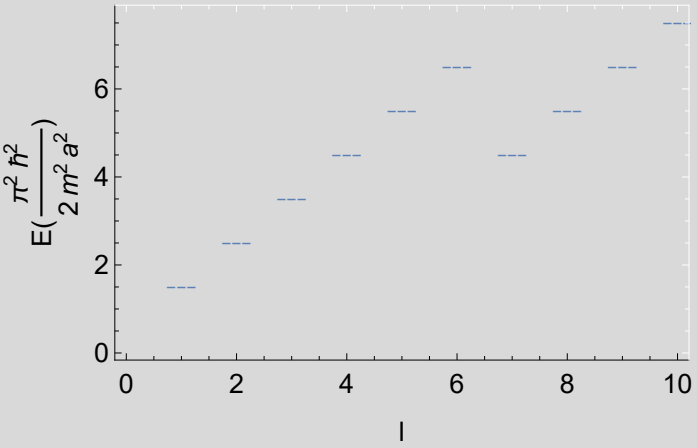
9) Find the energies and eigenstates for motion

In[117]:=
```
Etotal[nx_, ny_] := nx + 1/2 + ny^2; (* in the scale of π^2 ħ^2 / (2 m^2 a^2) *)

(* Find the 10 lowest energy levels shown in p.259 *)
E1 = Etotal[0, 1];
E2 = Etotal[1, 1];
E3 = Etotal[2, 1];
E4 = Etotal[3, 1];
E5 = Etotal[4, 1];
E6 = Etotal[5, 1];

E7 = Etotal[0, 2];
E8 = Etotal[1, 2];
E9 = Etotal[2, 2];
E10 = Etotal[3, 2];

Elevels = {E1, E2, E3, E4, E5, E6, E7, E8, E9, E10}
```

Out[128]=
$$\left\{\frac{3}{2}, \frac{5}{2}, \frac{7}{2}, \frac{9}{2}, \frac{11}{2}, \frac{13}{2}, \frac{9}{2}, \frac{11}{2}, \frac{13}{2}, \frac{15}{2}\right\}$$

In[131]:=
```
ThadPlot[ListPlot[Elevels, PlotMarkers → "---"], {"1", "E(π^2 ħ^2 / (2 m^2 a^2))"}]
```

Out[131]=



Degeneracies: $n_x = 3,\ n_y = 1$ and $n_x = 0,\ n_y = 2$; $n_x = 4,\ n_y = 1$ and $n_x = 1,\ n_y = 2$; $n_x = 5,\ n_y = 1$ and $n_x = 2,\ n_y = 2$