Sketching wavefunctions

Notes on Quantum Mechanics

http://NotesOnQuantumMechanics.com/SketchingWavefunctions.pdf
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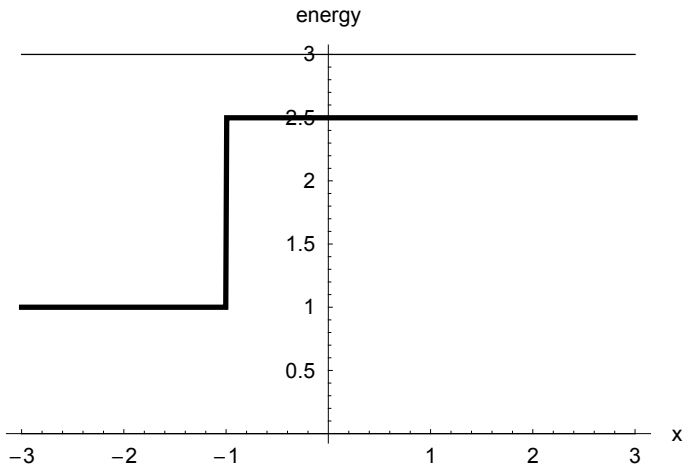
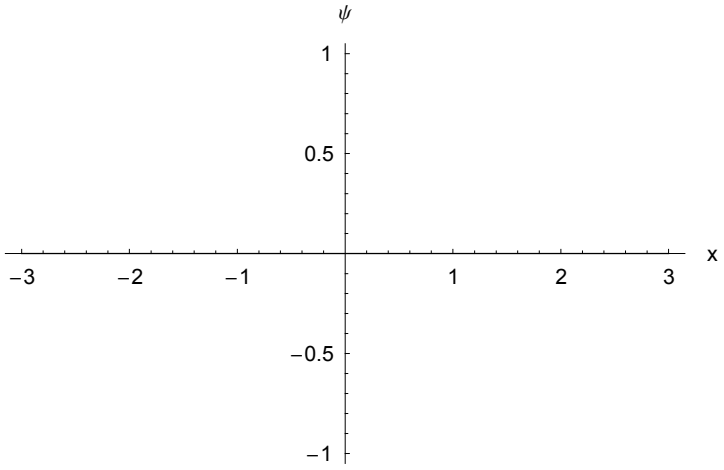
Department of Chemistry, Boston University, Boston MA 02215

In each of the following problems the first figure shows a potential energy function, $V(x)$ (thick line) and the total energy (thin line), and the second figure is axes on which you are to sketch the corresponding wavefunction. Be sure to sketch the wavefunction over the entire range of x values given on the wavefunction axes.

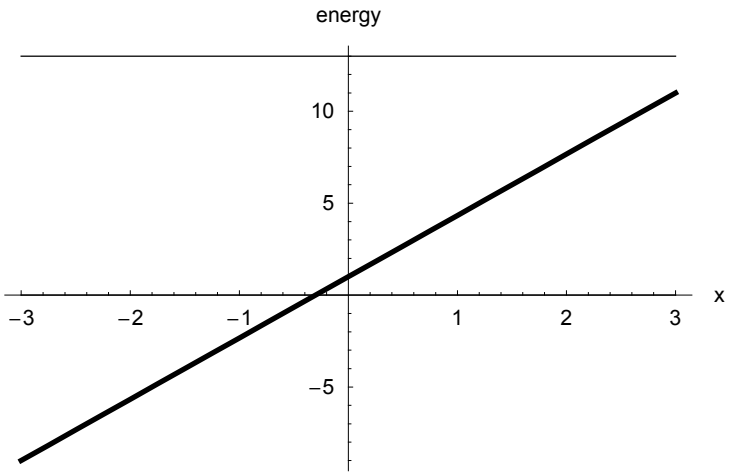
Unbound wavefunction 1



Start your wavefunction with value at $x = -3$ equal to $\psi(-3) = 0$ and have the left-most loop of the wavefunction extend from $x = -3$ to $x = -2$.



Unbound wavefunction 2



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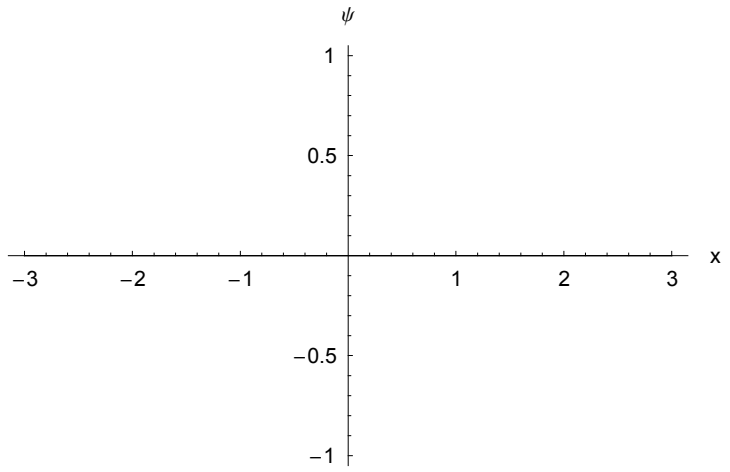
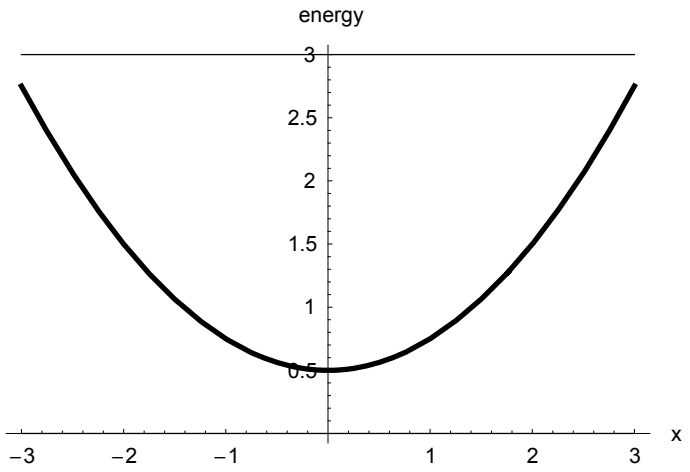


Unbound wavefunction 3



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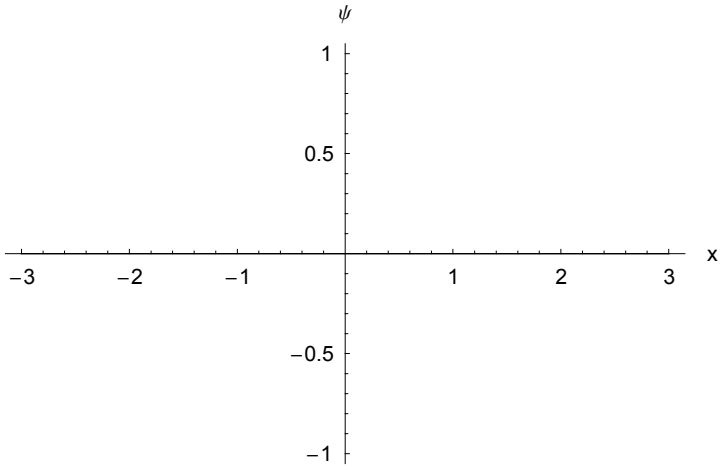
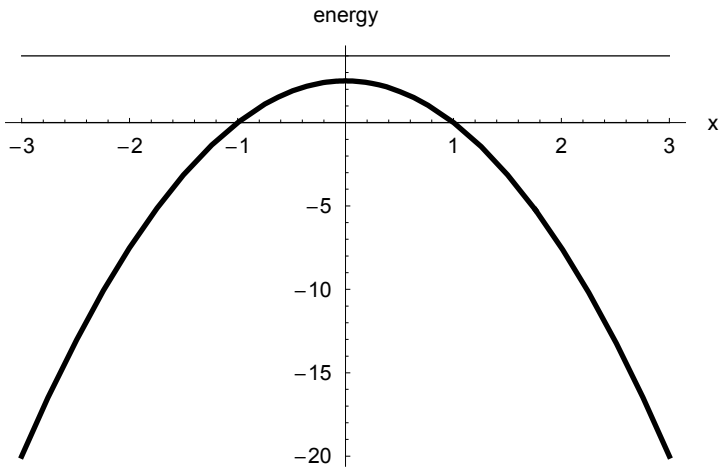


Unbound wavefunction 4



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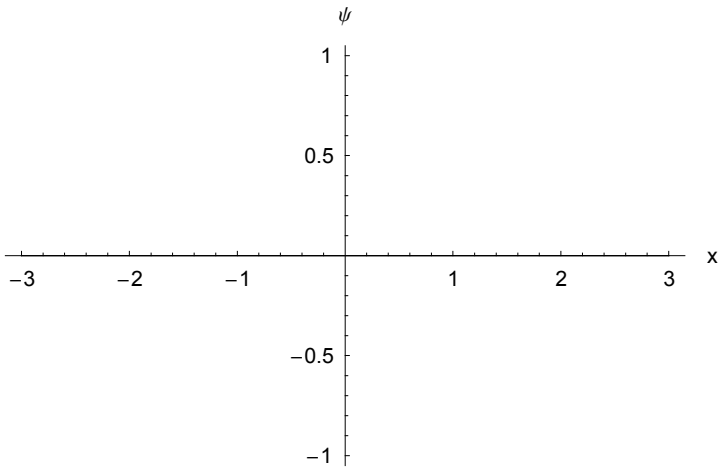
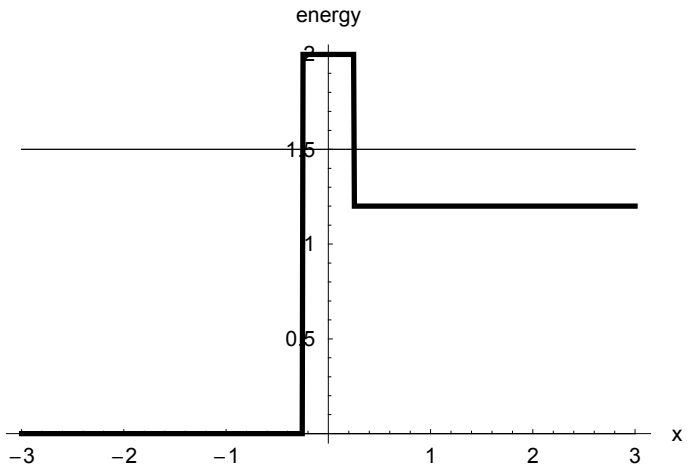


Unbound wavefunction 5



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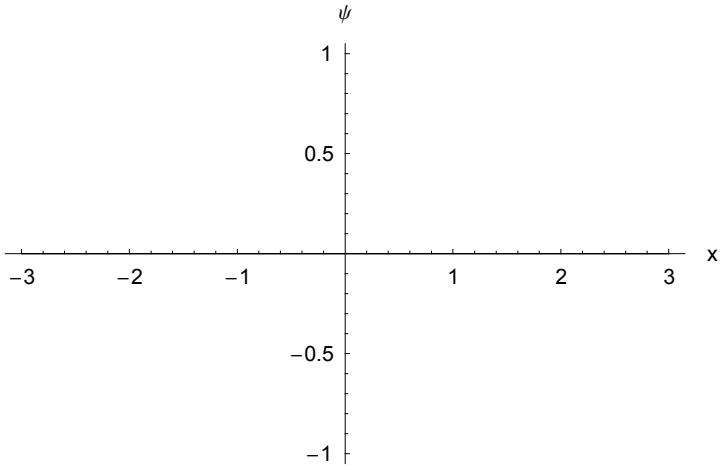
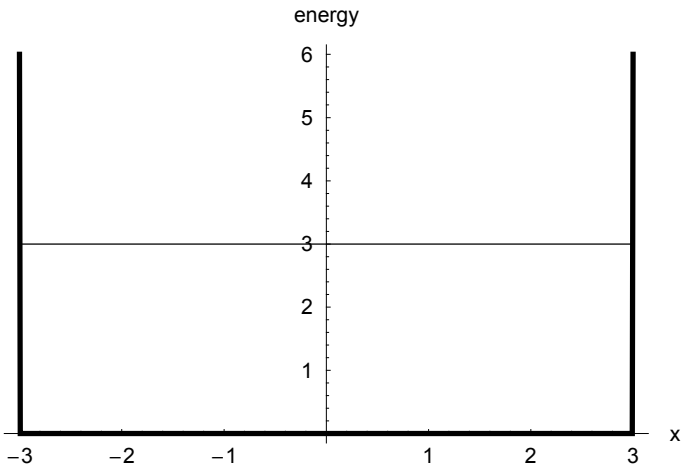
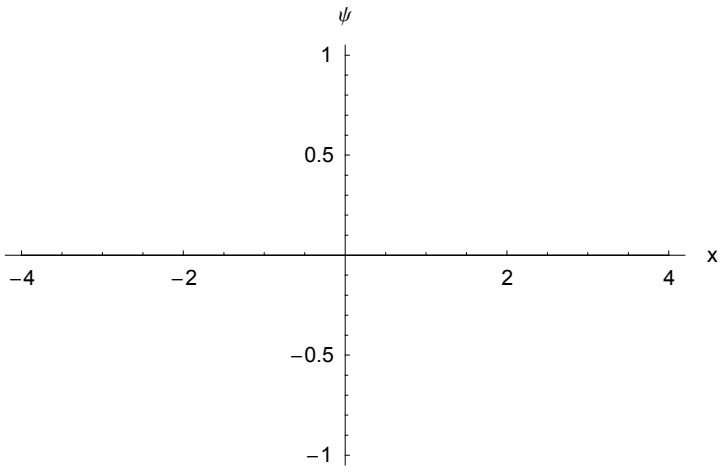


Bound wavefunction 1

The potential energy is infinite for $x < -3$ and $x > 3$.

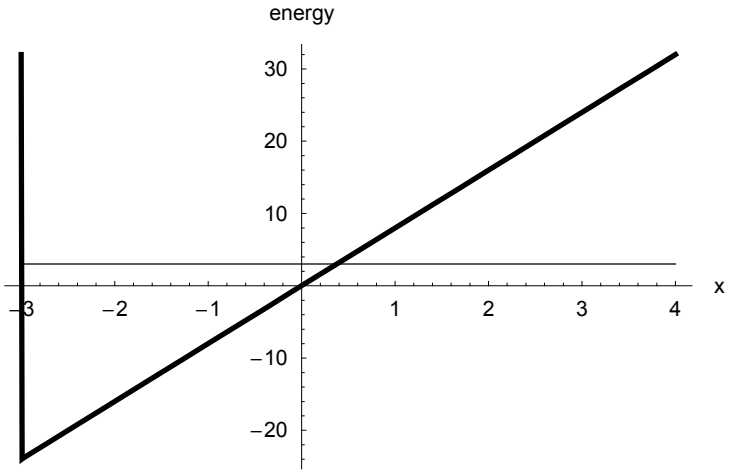


Assume the total energy corresponds to the lowest possible energy state.

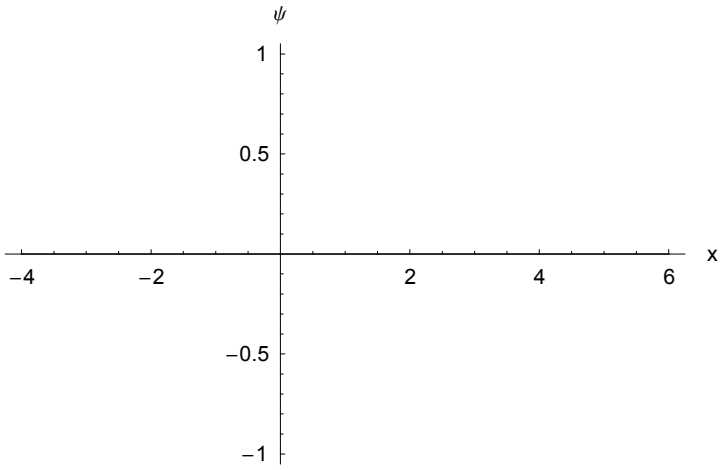


Bound wavefunction 2

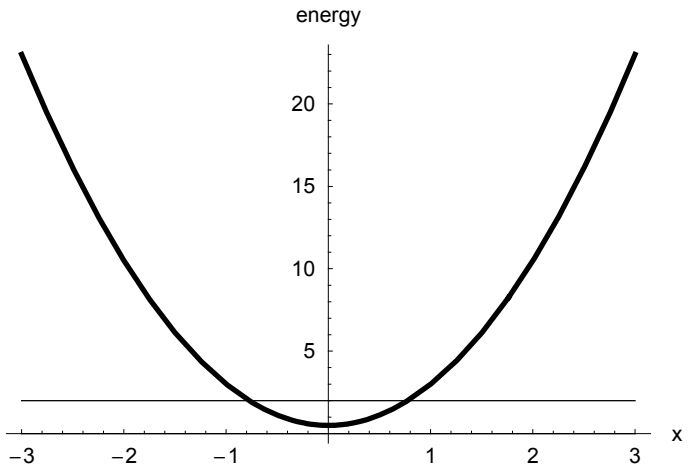
The potential energy is infinite for $x < -3$.



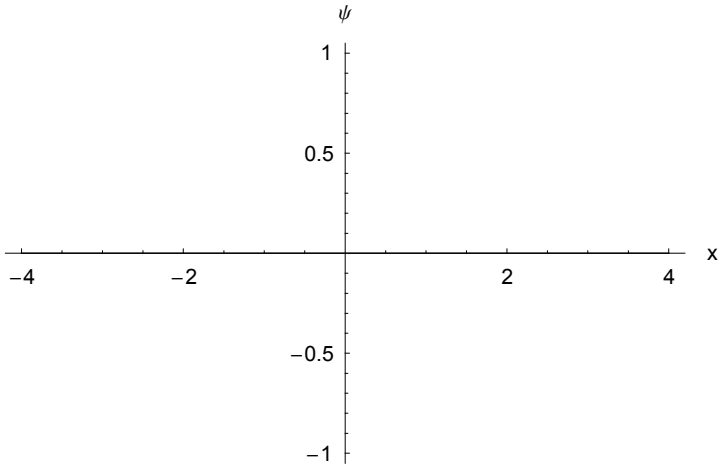
Assume the total energy corresponds to the third possible energy state, that is, assume there are two lower energy states.



Bound wavefunction 3

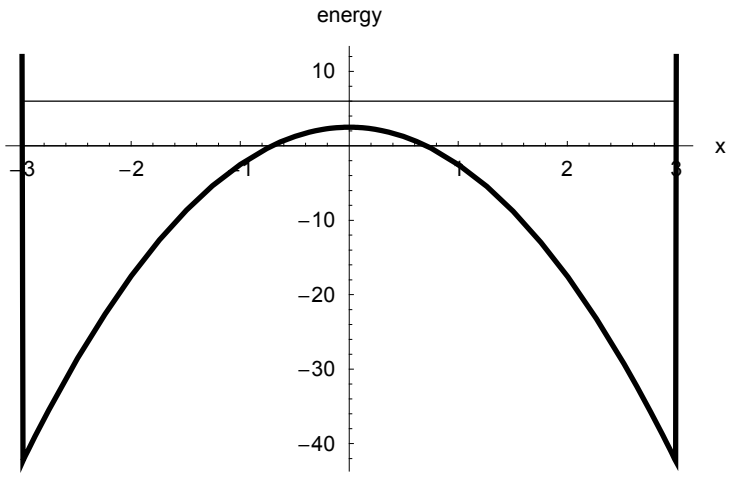


Assume the total energy corresponds to the lowest possible energy state.

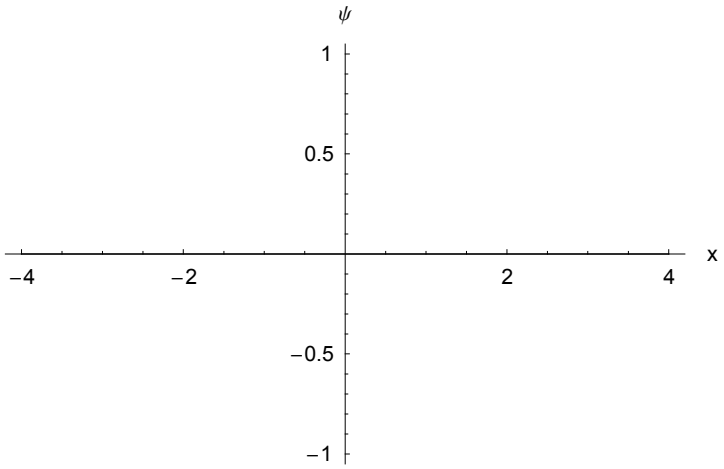


Bound wavefunction 4

The potential energy is infinite for $x < -3$ and $x > 3$.

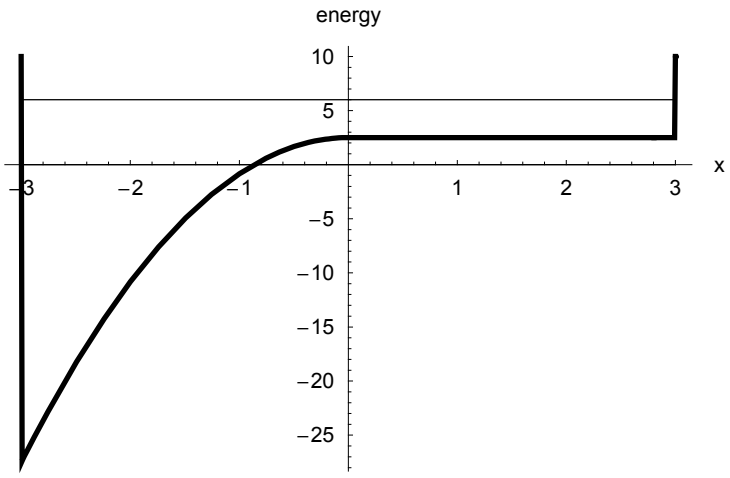


Assume the total energy corresponds to the fifth possible energy state, that is, assume there are four lower energy states.



Bound wavefunction 5

The potential energy is infinite for $x < -3$ and $x > 3$.



Assume the total energy corresponds to the sixth possible energy state, that is, assume there are five lower energy states.