PH 105 – Quantum Mechanics

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84)  
∂2ψ/∂x2 +[2m(E1-V)ψ]/ħ2 =0 ---(1)  
Substitute xψ into Schrodingers Equation  
  
x∂2ψ/∂x2 + 2∂ψ/∂x +[2m(E2-V) ψx]/ħ2 =0 ---(2)  
  
Multiply (1) by x and subtract from (2)

2∂ψ/ψ = [2m(E1- E2)/ ħ2]xdx  
  
a=2m(E1- E2)/ ħ2  
  
Integrating,  
**ψ = Cexp(ax2/4)**  ---(3)

Substitute (3) in (1)  
aψ(ax2/4+1/2) + 2m(E1-V)ψ/ħ2 = 0  
Simplifying  
V(x) = (E1- E2) (ax2/4+1/2) + E1 ---(4)  
Given , V(0) = 0  
  
**E2/E1 = 3**

Simplifying (4)

**V(x) = [(E1- E2)2mx2]/2 ħ2 + (3E1- E2)/2**