## Functions for potentials:

### *Step potential*

step(a) = 0 for x < a

= 1 for x > a

### *Barrier*

box(a,b) = 0 for x < a & x > b

= 1 for a < x < b

### *Finite Wells:*

finite (a,b) = 1 for x < a & x > b

= 0 for a < x < b

well(a,b) = 0 for x < a & x > b

= -1 for a < x < b

### *Infinite well:*

infinite(a,b) = ∞ for x < a & x >

= 0 for a < x < b

Numerical simulations tend to dislike hard bounds. Sometimes we use soft versions of the above potentials.

For example: A softer version of the box potential: sbox(a,b,h) where h is the hardness of the box. You could try out different values of h to be 10, 50,100.. to see what happens to the box potential.

You can also try out:

swell(a,b,h)

sstep(a,h)

Basic functions:

Absolute value of any number: abs(x)

Square root: sqrt(a)

Power of a number, x^a: pow(x,a)

Exponential of x: exp(x)

*Trigonometric functions*

sin(x), cos(x), tan(x)

sinh(x), cosh(x), tanh(x)

Arithmetic operators:

+, -, *, /

Constants

pi = 3.14159265358979323846

i = 0+1i

m= 1, ħ= 1

You are free to write any arbitrary potential or wave function using the above functions, constants and arithmetic operators.

For example:

- The harmonic potential is written as: 0.5*a*x^2
- The gaussian wave function is written as: sqrt(sqrt(a/pi))*exp(-0.5*a*x^2)
- A combination of potentials to design your own potential : -box(0,1)+step(2)-step(4)