Demo 5 Cheat Sheet: Harmonic oscillator and the quantumWorld library

quantumWorld library (imported as qworld)

Function	Purpose	Inputs
harmonic_oscillator_V(x, m, omega)	Return an array with the harmonic potential calculated on x	x: array of x values, m: mass of the particle omega=frequency
harmonic_oscillator_wf(x, n, m=1.0, omega=1.0, hbar=1.0)	Return the wavefunction for a harmonic oscillator	x: array of x values, n: quantum number m: mass of the particle omega=frequency
probabilityDensity(psi_x)	Return the probability density associated to a wavefunction	psi_x: array of wavefunction values

Matplotlib : Plotting (plt)

Function	Purpose	Inputs
plt.figure(figsize=(10,7))	Setup parameter for a graphic, in this case we will use it change size.	figsize= (inches width, inches height)
plt.plot(x,y,label="name", linewidth=2)	Plot lines	x, y = vectors label: string with name linewidth: number
plt.hist(x)	Plot a histogram.	X =vector
plt.xlabel("Axis x name",fontsize=12)	Set the x axis label of the current plot. (Similar for y axis)	Name = string
plt.xlim([xmin,xmax])	Set the "x" limits of the current axes. (Similar for y axis)	xmin,xmax = scalars
plt.title("Plot name",fontsize=12)	Set a title of the current plot.	Name = string
plt.show()	Display a figure.	
plt.legend()	Display legend of the figure	Labels (strings) separated by comma. Labels can be provided in plt.plot instead.
plt.xticks(fontsize=12)	Display ticks for axis x (Similar for y axis)	fontsize: number

Demo Specific - Common variables:

x == array with x values
V_x == harmonic potential
wf == wavefunction
pdf == probability density function
omega == oscillator frequency, default 1.0 (in atomic units)
m == mass of the particle, default 1.0 (in atomic units)
n == quantum number

Function	Purpose	Inputs
my_plotting_function(x,functions_list,labels,title='Plot',xlab='x',ylab='f(x)',fts=12,lw=2,fs=(10,8))	Return a plot	- x: array with x values functions_list: list of arrays representing functions you want to plot labels: list of labels. It should have the same size as functions_list title: title of the plot (Default: 'Plot') xlab: name of the xlabel (default: 'x') ylab: name of the ylabel (default: 'f(x)') fts: fontsize for legend, axes and labels (default: 12) lw: linewidth for the lines of the plot (default: 2) fs: figure size (default:(10,7))

Common function for libraries and miscellaneous

Function	Purpose	Inputs
dir(library)	Display the names of all the function in a module/library	Name of the library (as imported)
imp.load_source(name,path_of_library)	Import a library from path_of_library with the name specified	name = string path_of_library = string
help(name_of_function)	Return the documentation of the function.	name of the function
x = np.arange(-1.0,1.0, 0.1)	Return an array evenly spaced values within a given interval according to a step size.	start, stop, step_size
x = np.linspace(-1.0,1.0, 100)	Return an array of evenly spaced numbers over a specified interval.	start, stop, number of points