

In this assignment, we have to draw the wave functions and the probability of presence, of course we print the energy values in each level. In $(-\frac{L}{2}, \frac{L}{2})$

It is noteworthy that the results and calculation items are stated in the previous part.

First, we observe the energy values for 4 levels:

```
% Calculate and print the expression E_n = E0 * userNumber^2
En_odd  = E0 * n^2;
En_even = E0 * n^2;
```

```
Enter a number of energy level: 4
En_odd_1 = E0
En_even_2 = 4*E0
En_odd_3 = 9*E0
En_even_4 = 16*E0
```

Now, based on what was discussed in the class, we drew the wave functions (of course, the code is also given below).

```
% Sine function with changing formula based on userNumber
y_odd  = sqrt(2/L)*cos(n*pi*x/L);
y_even = sqrt(2/L)*sin(n*pi*x/L);
```

```
% Create subplots
subplot(userNumber, 2, (n-1)*2 + 1);
fplot(y_even, [-L/2, L/2]);
title(['Wave Function, n = ' num2str(n)]);
xlabel('x');
ylabel(['sin(' num2str(n) '\pi x/' num2str(L) ')']);
grid on;

subplot(userNumber, 2, (n-1)*2 + 2);
fplot(y_even^2, [-L/2, L/2]); % Plot y^2 for the product with the conjugate
title(['Probability of Attendance, n = ' num2str(n)]);
xlabel('x');
ylabel(['sin(' num2str(n) '\pi x/' num2str(L) ')^2']);
grid on;
```

```

% Create subplots
subplot(userNumber, 2, (n-1)*2 + 1);
fplot(y_odd, [-L/2, L/2]);
title(['Wave Function, n = ' num2str(n)]);
xlabel('x');
ylabel(['cos(' num2str(n) '\pi x/' num2str(L) ')']);
grid on;

subplot(userNumber, 2, (n-1)*2 + 2);
fplot(y_odd^2, [-L/2, L/2]); % Plot y^2 for the product with the conjugate
title(['Probability of Attendance, n = ' num2str(n)]);
xlabel('x');
ylabel(['cos(' num2str(n) '\pi x/' num2str(L) ')^2']);
grid on;

```

As it is clear, since we have to get the probability, we have to use the $\int_0^L \psi \psi^*$ formula:

