I decided to plot the double helical structure of DNA using MATLAB. I chose to do this because I have always liked the structure of DNA. I also chose this because it involved both the graphical as well as the mathematical aspect of MATLAB. My program asks the user to input the number of complete turns he expects to see in the double helix. It only accepts even numbers (a limitation as the double helix was plotted using the sine curve), if an odd number is entered it displays a message and exits the program.

After getting the number of loops from the user, the program first plots the double helix with the number of loops as entered by the user. This is done using the sine and negative sine curves.

The 'axis' command is used to give the user a better view of the plotted DNA strand depending on number of loops requested. Then comes the plotting of the DNA bases. This is done using two nested loops. The bases are plotted using variables, two half loops at a time, starting at the left end. This is the function of the inner 'while' loop. The outer 'while' loop functions to increment the x co-ordinate by 1 so that every time the inner loop is executed the bases get plotted in a different half, i.e. it switched control from the 1st half to the 3rd half to the 5th half and so on.

This is the basic step by step working of the program and at the end the complete double helix structure of DNA is displayed to the user.

Commands:

```
% dna - A function file to draw the Structure of the DNA
% To excexute just type dna
% -------------------------------------------------------

function dna
l=input('Enter no. of complete loops in helix structure(even no.): ');
                                            % ask user for no. of turns
if(mod(l,2)~=0)                             % check if the no. is even
    fprintf('Error! Wrong number entered please restart. ');
    return
end
l=(l/2)+0.5;                                %to make open half loops at
                                            % each end
x=linspace(-l*pi,l*pi,100);                 %start and end x co-ord
y=sin(x);                                   %y co-ord for each x
plot(x,y,x,-y);                             %plot the double helix
hold on
j=-l*3;                                     % x co-ord for the 1st base
axis ([j-1 -j+1 -3 3]);
z=-l+1;                                     % to plot bases in the 1st 2
                                            % halves
while(z<(l*3+1))                            % loop to switch halves
    while(j<z)                              % loop to plot the bases
        a=sin(j);
        i=linspace(a,-a,1000);
        plot(j,i)
        j=j+0.4;
        a=sin(j);
    end
z=z+1;                                      % switch to next 2 halves
end
```