**Pre-lab Tasks**

**Task 01:**  Plot a function between the interval.

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| x=[0:0.1:6\*pi]  wave=(exp(1)^-0.2\*x).\*sin(x);  plot(wave) |

**In-lab Tasks**

**Task 02:** Make a function ‘my\_sum’ which takes two vectors xand yas input.The vectors should have different sizes. Firstly, make size of both the input vectors same by padding (concatenating) zeros. Now add both the vectors element wise. The function should return a variable z which should contain the sum of all the elements of the vectors formed as a result of summation of input vectors x and y.

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| function [Z] = my\_sum(V1,V2)  %MY\_SUM Summary of this function goes here  % Detailed explanation goes here  [r1,c1]=size(V1);  [r2,c2]=size(V2);  if (r1==1&&r2==1)  disp('this is row vector')  small=c1-c2;  if (small<0) %column 2 is large  for i= 1:1:abs(small)  V1= [V1 0];  end  end  if (small>0)  for i=1:1:small  V2=[V2 0];  end  end  Z=V1+V2  elseif(c1==1&&c2==1)  disp('this is a column vector')  small=r1-r2;  if (small<0) %row2 is large  for i= 1:1:abs(small)  V1= [V1;0];  end  end  if (small>0)  for i=1:1:small  V2=[V2;0];  end  end  Z=V1+V2  else  disp('one vector is row other is column')  end    end  **output:** |

**Task 03:** Write MATLAB programs to find the following with for loops and vectorization. Time both versions in each case.

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| **Part A:**  %by using for loop.  tic %Tloop=clock;  z=1;  for a=2:1:1000  z=z+a^2;  end  %etime(clock,Tloop);  toc  %by using vectorization.  tic %Tvector=clock;  X=[1:1:1000].^2;  Y=sum(X);  %etime(clock,Tvector);  toc  **Result:**  z=333833500  Y=333833500  Time Elapsed by using loop method=0.000403  Time Elapsed by using Vectorization=0.000394  **Part B:**  %by using loop  Tloop=clock;  V=[1];  a=3;  for i=3:2:1003    if rem(a,2)~=0%gives u remainder of the division  V=[V -i];  else  V=[V i];  end  a=a+1;  end  V=1./V;  X=sum(V)  etime(clock,Tloop)    %by using vectorization  Tvector=clock;  Z1=[1:4:1003];  Z2=[-1003:4:-3];  Z=sum(1./Z1 + 1./Z2)  etime(clock,Tvector)    **Result:**  X= 0.7849  Z= 0.7849  Time Elapsed by using loop method=0.003827  Time Elapsed by using Vectorization=0.000469  **Conclusion:**  Loops are slower then vectorization. So it is preferred that while making a large program use vectorization to save time. |

**Task 04:** Graph the following function in MATLAB over the range of 0 to 10.

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| x=[];  y=[];  for i=0:0.1:10  x=[x i];  if sin(i)>0  y=[y sin(i)];  else  y=[y 0];  end  end  plot(x,y) |

**Task 05:** Use the semi log graph to graph over the interval of .

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| X=[0:0.1:2\*pi];  semilogy(X,X.^2,X,X.^3,X,X.^4,X,exp(1).^X.^2) |

**Task 06:** Plot the first ten cycles of sinusoid (sin) with time period of 2 seconds. The horizontal axis corresponds to time period of the sinusoid while vertical axis depicts the values of sinusoid.

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| % A sin(2\*pi\*f\*time +angle)  A=1;  time=[0:0.1:20];  wave=A\*sin(2\*pi\*(1/2)\*time);  plot(wave) |

**Task 07:** Plot the following discrete sequences

Horizontal axis corresponds to instances n and vertical axis depicts values.

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| **Part A:**  a=1.5;  n=[0:1:10];  signal=a.^n;  stem(n,signal)    **Part B:**  n=[-10:1:-1];  b=1.5;  signal=b.^n;  stem(n,signal)    **Part c:**  g=0.5;  n=[0:1:10];  signal=g.^n;  stem(n,signal)    **Part D:**  o=0.5;  n=[-10:1:-1];  signal=o.^n;  stem(n,signal) |

**Task 08:**

Where A = 1, f0 = 10 Hz,

Plot the second and third harmonics of the above sinusoid. Use SUBPLOT command for drawing in the same manner as in previous question. After plotting explain the relation of fundamental Time period and harmonics Time period clearly. Your answer should corroborate the graphs drawn.

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| A=1;  t=0:0.001:1;  f1=10;  f2=20;  f3=30;  O=0;  y1=exp(t.\*2\*pi\*f1\*1i);  y2=exp(t.\*2\*pi\*f2\*1i);  y3=exp(t.\*2\*pi\*f3\*1i);  subplot(3,1,1),plot(t,y1)  subplot(3,1,2),plot(t,y2)  subplot(3,1,3),plot(t,y3) |

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**Post-lab Task**

## Critical Analysis / Conclusion

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| **MATLAB is a powerful software used to perform complex mathematical problems and plot graphs of functions. In this lab we wrote conditional scripts and functions. We also plot continuous time functions and discrete time functions.**  **Matlab provides different types of plot format i.e. logarithmic plots ,subplots etc.**  **Unlike other programming languages the loop in matlab is slow so it is avoided if possible.** |