MATLAB CHEATSHEET

**A basic compilation of functions, helpful and repetative actions, and more!**

**Random notes and functions**

qfunc %this will return the value of k i.e. Q(k) which is used for gaussian probabilities and more probability items.

bar () %this is a way to display probablility graphs! just like plot, it will display blocks on a plot.

**example code snippets**

**Filename: Lecture10matlab(1).mlx**

%this code displays a for/if loop to impliment a rectangular pulse

fs = 100; ts = 1/fs; % fs = sampling frequency

t1 = 0; t2 = 5; tau = 1 %start and end time, as well as transition of amplitude time (tau)

Av = 1; %amplitude

time = t1:ts:t2; %time duration which will be plotted

l = length(time);

% Generate v(n)

for n = 1:l %this is one : lowercase L which is the length of time

if time(n) <= tau %tau is when the amplitude goes from Av to zero again

v(n) = Av;

else v(n) = 0;

end

end

plot(time,v)

axis([0 5 0 1.5])

xlabel('Time (s)')

ylabel('v(t)')

%next in this document is the Fourier transform

% Find the Fourier Transform.

M = 2^10; %this is the sampling value in frequency domain

%note that vn is the time domain while Vf is the frequency domain

Vf = ts\*fftshift(fft(v,M)); %note this formatting, this goes for ALL TRANSFORMS

% Generate frequency axis

df = fs/M;

freq = -(fs/2 - df):df:fs/2;

plot(freq,abs(Vf)); %then, note to get the amplitude graph of Vf in frequency domain, the abs of Vf must be taken.

plot (freq, angle(Vf)) %just like abs, angle gives the angle of Vf in the frequency domain.

**Filename: ConvolutionExampleF22.mlx**

%stem works just like plot! every time a value is calculated, a line is placed to display a sample.

%rather than doing what plot does which is simply placing the line rather

%than sample lines.

stem(time,v)

% Calculate the convolution

%note that w and v are two different functions/plots and ts is the

%sampling time.

z = ts\*conv(v,w); %conv() is the convolution of the two functions.

stem(time,z(1:l)) %since both v and w in this file are rectangular pulses, the ratio from the

% for/if loop is used to graph z or the convolution equation correctly.

**Filename: Lecture12matlab.mlx**

% Let x (t) = cos (2\*pi\*100\*time) + cos (2\*pi\*400\*time). Find x (n) by sampling x(t) with

% fs = 1000 Hz to generate N = 1000 samples.

% (a) Plot x(t).

fs = 1000; ts = 1/fs; N = 1000;

time = 0: ts : (N-1)\*ts; % Generate time

%time here could be important! this is (samples-1) times the sample

%time given by the frequency fs. Note that the separation between time

%markers is also ts or the sampling time.

f1 = 100.0; f2 = 400.0;

x100Hz = cos(2\*pi\*f1\*time); %first chunk of x(t)

x400Hz = cos(2\*pi\*f2\*time); %second chunk of x(t)

x = x100Hz + x400Hz; %finally adding the two of them together to graph!

plot (time, x100Hz);

plot (time(1:N1), x100Hz(1:N1)) %another way to plot over a specific sample size, N1;

%since time and x100Hz are both dependent on the time interval, both

%need this reference to work correctly

wn = 0.4; %cuttoff value that is given in the problem

[b, a] = butter(4,wn,'low') %this takes the values and low for LPF, and turns it into a butterworth graph

%note that 4 is the order, wn is the cuttoff and low is the type of

%butterworth

y1 = filter(b,a,x); %this puts the butter worth values through a filter!

**Filename:Lecture14Matlab(1).mlx**

a=[1 1]; b = [1]; %input matrix values

t = 0:0.01:10; % time ratio

y = impulse(b,a,t); % impulse takes matrix and time ratios to graph an impulse function

% Calculate frequency response

f=0:0.01:1; %frequency ratio

w=2\*pi\*f; %converting to radians

H=freqs(b,a,w); % and how creating a frequency graph for the impulse function using the same a and b matrix as well as the new radian value.

plot(f,abs(H));

**Quiz code snippets**

**Quiz 1 snippet**

%period = 0.02s

% use fs = 1e4 (10,000 Hz)

fs = 1e4; ts = 1/fs;

time = 0:ts: 0.04;

v = -4 + 8\*cos(200\*pi\*time + pi/6) - 4\*sin(500\*pi\*time + pi/3); %note phasors are in pi factors

**Quiz 2 snippets**

%okay, so the j in V represents the complex portion of the function.

%note that the function is ALREADY IN THE FUNCTION DOMAIN

f = -4:0.01:4;

V = j\*2\*pi\*f.\*sinc(f).\*sinc(f); %sinc^2 function works better setting two of them multiplied together

**Quiz 3 snippets**

% (2f) plot n(x), where n(x) is the number

% of students who scored x points

mx=60; sigmax=15;N=500; %distributions (sigmax), median, and students total

x=0:1:100;%score distribution, zero to 100 points

y=pdf('norm',x,mx,sigmax); %pdf is a pission distribution that takes the range of values, median, and distribution

% plot(x,y)

nx=N\*y; %displays the distribution times the amount of students

plot(x,nx) %which can then be plotted here

n91\_100 = (sum(nx(92:101))); %finds the value of scores between 91 and 101 in this cause (101 isnt counted, just includes 100 as a value to count)

n91\_100\_round=round(n91\_100); %rounds value to next integer, no half people here

%these two lines allow values to be printed and displayed...could also

%user disp(); to print rather than formatSpec...

formatSpec = '(2g): Number of students scoring 91 to 100 = %d\n';

fprintf(formatSpec,n91\_100\_round)

**midterm code snippets**

%problem 3:

disp('Problem 3')

%note that all values here are from the H(f) function for the RC circuit

B = 1000; C = 1e-6;

L = 1/(4\*pi^2\*B^2\*C);

%B1 = (1/(2\*pi))\*1\*sqrt(L\*C) %check on the value of L

R = sqrt(L/(2\*C));

c1 = (2\*pi\*L)/R; c2 - (2\*pi)^2\*2\*L\*C;

fprintf('B(Hz) = %f\n', B) %there are ones for C L and R as well

%this format will make it easier to take individual values for frequency!

for k = 1:5001 % df = 1Hz, this is the range of frequency that we will graph

f(k) = k-1;

H(k) = 1/(1+j\*c1\*(k-1)-c2\*(k-1)^2); %this is the H(f) equation

end

plot (f, abs(H)); %this is now plotting the graph in the for loop.

%view the format of the for loop which allows this to be possible!

fprintf('|H(0 Hz)| = %f\n', abs(H(1))) %note that the 1 can be any value within the range of k in the for loop

%this is how the value of H(f) at a specific f value can be determined.