

INTRODUCTION TO MATHEMATICS FOR DSP

SET 8: USEFUL MATLAB COMMANDS

INPUT/OUTPUT COMMANDS

```
x=input('Enter the value of x');
```

Read the value of x from the command line

```
disp(x);
```

display the value of x on the command line.

```
M=dlmread('filename', ' ');
```

Read numeric data from a file with elements separated by spaces

```
fid=fopen('sample.pcm');
```

```
signal=fread(fid, 'int16');
```

Open a binary format file and read the contents into the matrix signal.

MATRIX OPERATIONS

```
x'*y
```

Multiplication of two column vectors.

```
x.*y
```

Element by element multiplication of x and y.

```
x=1:3:22
```

Initialize a vector x =[1 4 7 10 ... 22].

```
sum(x)
```

Sum of all elements of the vector(x)

```
[m,n]= max(x)
```

Maximum value of x is stored in m, and the position at which it occurs is stored in n.

```
[m,n]= min(x)
```

Minimum value of x is stored in m, and the position at which it occurs is stored in n.

SIGNAL PROCESSING FUNCTIONS

```
fft(x,n)
```

Calculates the n-point dft of a vector x.

```
ifft(X,n)
```

Calculates the n-point IDFT of X(k)

```
filter(b,a,x)
```

Filters the vector x with a filter whose numerator co-efficients are given by 'b' and denominator co-efficients are given by 'a'.

```
conv(u,v)
```

Convolution of vectors u and v.

```
xcorr(x,y)
```

Cross correlation of vectors x and y.

```
fliplr(y)
```

flips the vector y (e.g. for obtaining y[-n])

```
[H,w]=freqz(num, den, w);
```

Calculate the frequency response H at a set of frequencies w, given a DTFT with numerator 'num' and denominator 'den'.

```
abs(H);
```

Absolute value (magnitude) of a complex vector H

```
angle(H)
```

Phase or argument values for the vector H.

```
[h,t]=impz(num,den);
```

Power series expansion of the z-transform expression defined by 'num' and 'den'.

```
sound(y,Fs);
```

Sends the signal in vector y (with sample frequency Fs) to the speaker of the PC.

```
[b,a] = zp2tf(z,p,k);
```

Converts the zeros 'z', poles 'p' and gain 'k' to a transfer function with numerator 'b' and denominator 'a'.

PLOTTING FUNCTIONS

```
plot(1:length(p), p);
```

continuous plot of the vector p.

```
xlabel('time'); ylabel('amplitude');
```

labels for the x and y axis.

```
title('This plot is funny');
```

title to be above the plot.

```
stem(1:length(p), p);
```

discrete time plot of p.

```
plot(1:N,p);
```

```
hold on;  
plot(1:N,q);  
Plot two vectors 'p' and 'q' on the same plot.
```

```
subplot(2,1,1);  
plot(1:N,p);  
subplot(2,1,2);  
plot(1:N,q);  
Plot two plots on the same figure.  
zplane(num,den)
```

Pole Zero plot for the z transform with numerator coefficients 'num' and denominator coefficients 'den'.