**ECE324: DIGITAL SIGNAL PROCESSING LABORATORY**

**Marks Obtained**

**Job Execution (Out of 40):\_\_\_\_\_\_\_\_\_**

**Online Submission (Out of 10):\_\_\_\_\_\_\_\_**

**Practical No.: P2 (Should be according to your allotted practical sequences. Not according to your IP or your wish. )**

**Roll No.: E1403 B30 Registration No.: 11411765 Name: Melvin Felix**

**Note:**

* All programs should be completed **without using inbuilt function of MATLAB**.
* Aim of the practical should be according to the IP.
* In Mathematical expressions write all formulas or equations which you are going to implement on MATLAB for completion of the allotted practical. (Use ‘Insert equation’ feature of MS office if required).
* In Program Code section, copy your m-file content and paste it. **Don’t change any font size/style/color in this section**.
* Don’t write and comment statement in m-file.
* Upload your report in ‘PDF’ format on UMS, also submit your M-files to your instructor in proper format**\***.
* Fill the check list section before submission **and sign it**.

**Aim:** To make a MATLAB function for calculating linear convolution of given signal

1. Find the linear convolution of a time limited sine and cos sequence

2. Find the linear convolution of a time limited sine and exponential sequence

**Mathematical Expressions Required: exp(), sin(), flipud(). length(), zeros(), sum()**

**Inputs (Should be allocated by the Instructor, Individually):**

**(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)**

**Signatures of Instructor**

MATLAB Code:(1A)

%convolution of two sequences

%

%

%

%

%

function[y\_op] = linear\_convolution\_mf(x\_ip,y\_ip)

l\_x = length(x\_ip); %length of the input

l\_h = length(h\_ip); %length of the second input

l\_y = l\_x + l\_h - 1;

y\_op = zeros(1,l\_y);

x = [x\_ip zeros(1,(l\_y-l\_x))];

h = [h\_ip zeros(1,(l\_y-l\_h))];

h\_trans = h';

y\_mul = h\_trans\*x;

y\_mult = flipud(y\_mul);

loop\_run = l\_y-1;

for i = 1:l\_y

y\_op(i) = sum(diag(y\_mult,-(loop\_run)));

loop\_run = loop\_run - 1;

end

end

Part (1B):

t = 0:.01:1;

x\_sin = sin(2\*pi\*3\*t);

y\_cos = cos(2\*pi\*2\*t);

y1 = linear\_convolution\_mf(x\_sin,y\_cos);

z1 = conv(x\_sin,y\_cos);

figure

plot(y1)

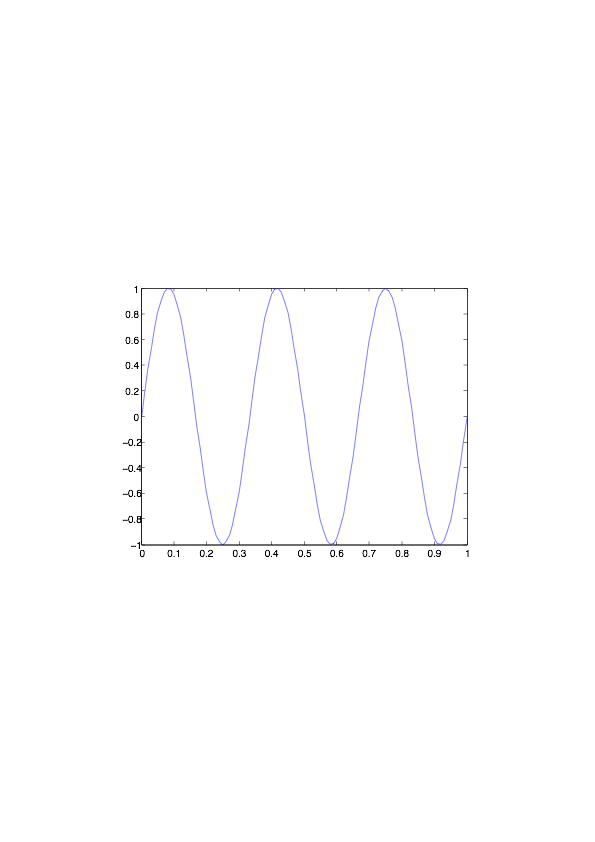
figure

plot(z1)

z\_exp = exp(t);

y2 = linear\_convolution\_mf(x\_sin,z\_exp);

z2 = conv(x\_sin,z\_exp);

figure

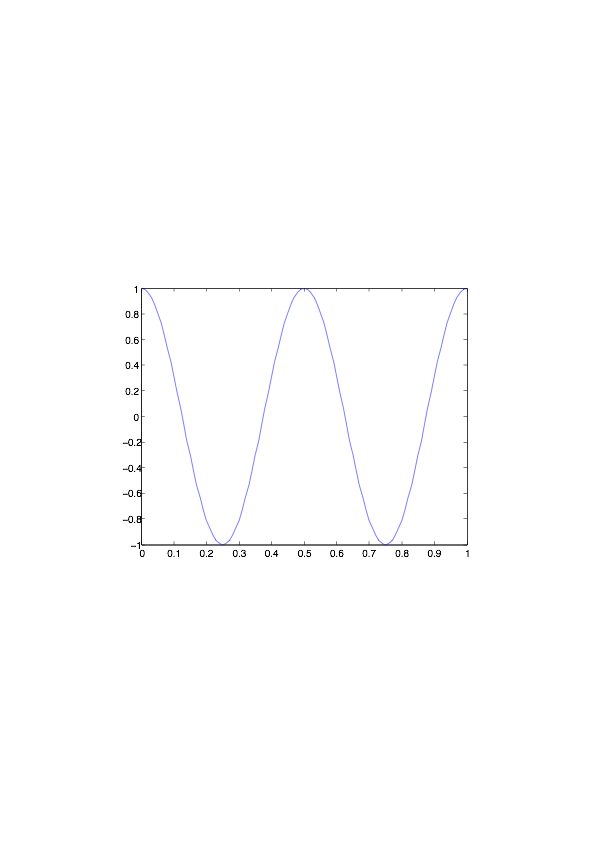
plot(y2)

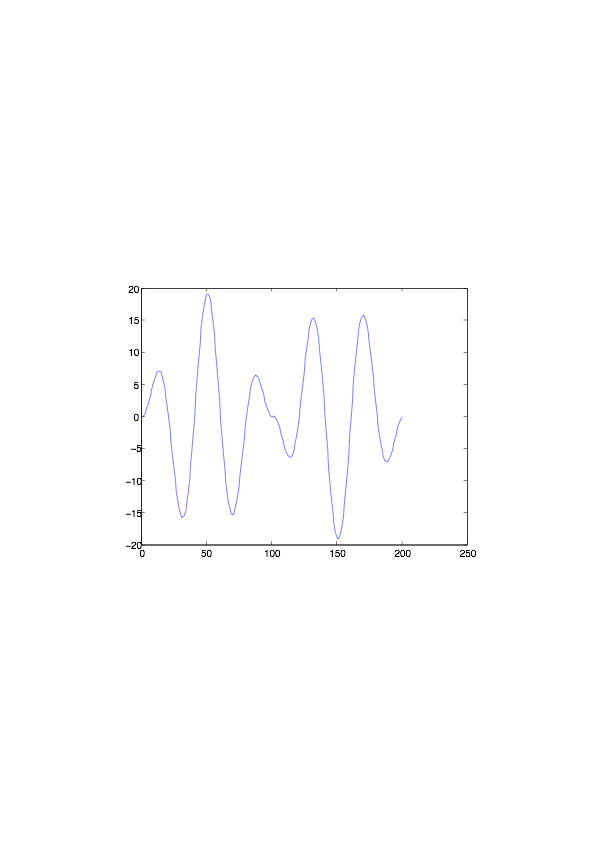
figure

plot(z2)

**Graphs**:

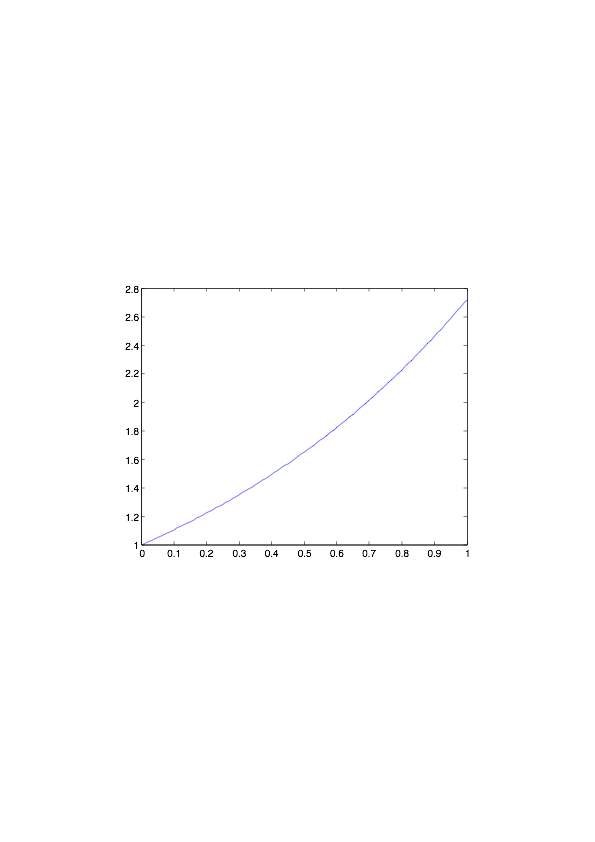
1. Input Sine

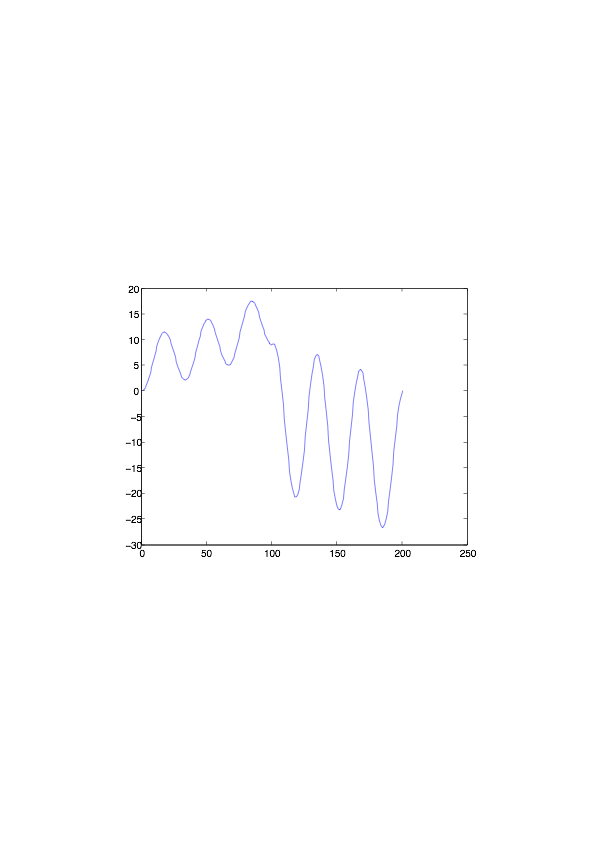
2.**Input cos**

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**3.Output convoluted wave**

**4.Input exp**

****

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**Output:**

**Analysis/ Learning outcomes:**

1. I’ve learnt how to calculate the convolution of two time limited sequences and verified it using the in-built function
2. I’ve learnt the theory behind convolution and it’s implementation
3. I’ve learnt how to create and name a function in a given file

|  |  |
| --- | --- |
| **Check list before submission** | **By Student (Yes/No)** |
| Have you used any in-built function? | Yes |
| Have you written the description of each variable in work space? | Yes |
| Have you written the description of each figure in your results? | No |
| Have you compared your function output with the in-built function? | Yes |
| Did you analysis the results and outcomes properly? | Yes |
| Are you going to submit your report in PDF format? | Yes |
| Have you named your function files according to the **Student’s Function Name Format?** | Yes |

(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**Signature of Student**

**\*Student’s Function Name Format**

* Let the roll number of the student be **RE0000A000**, and he want to submit practical number two (**P2**). In this program he make a function which work similar as in built function ‘**conv**’ so m-file name must be **‘RE0000A000P2conv’** . )
* Second M-file/function which has to be written to get the outputs for the allocated inputs by using first function **RE0000A000P2conv**, must be named as ‘**RE0000A000P2**’