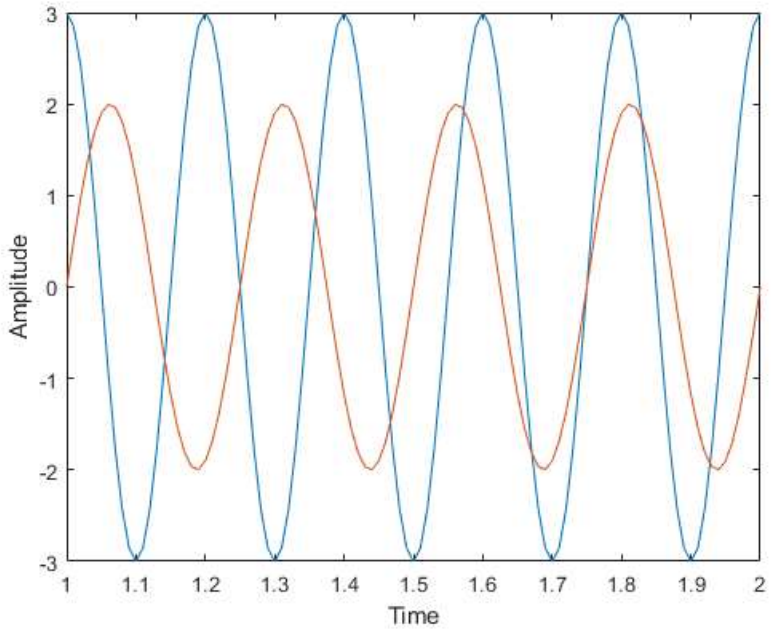
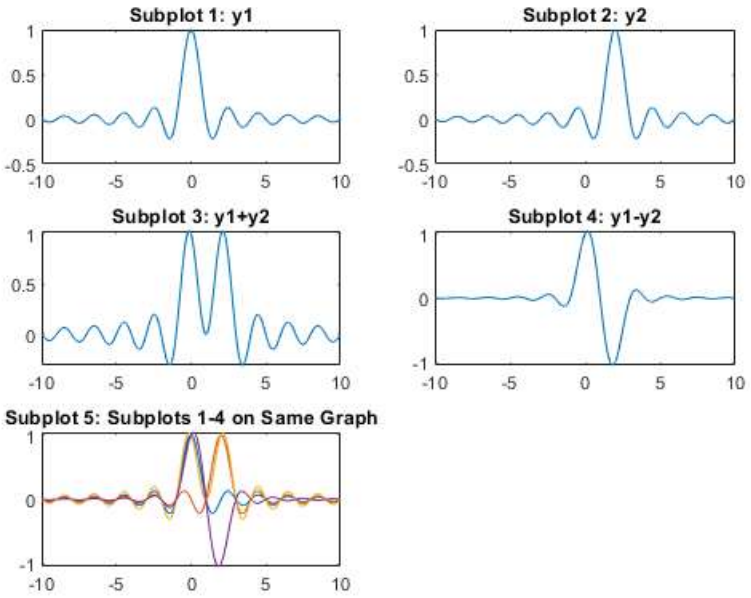
```
%%Lab 1, Part 1, ECEN 142
clear; clc;
%Step 1:
x1=[1,2,3,4]; %semicolon causes x1 to not print to command window
x2=[3,4,5,6] %No semicolon causes x2 to print to the command window
x3=[x1 x2]; % This displays x1 and x2 together in one row (1x8)
x4=[x1;x2]; % this displays x1 and x2 together, but in their own rows (2x4)
length(x3) %this counts the number of data values in x3, which is 8
size(x4) % this counts the size of the matrix x4, which is a 2x4 matrix
x5=5.*x4; % this multiplies each element in matrix x4 by 5 and saves it to variable x5
```

```
x2 =

     3     4     5     6


ans =

     8


ans =

     2     4
```

```
%Step 2
clear;
clc;
f = 5;
t = 1:0.01:2;
x = 3*cos(2*pi*f*t); %original signal x, that is 5 Hz cos with amplitude 3
y= 2*sin(2*pi*4*t); %new signal, y, that is a 4 Hz sine with amplitude 2
plot(t, x);
hold on
plot(t,y);
hold off
xlabel('Time');
ylabel('Amplitude');
%These figures match what I expected, with clear amplitudes and periods
```



```
%Step 3
clear;
clc;
x = -10:0.01:10;
y1 = sinc(x);
y2 = sinc(x-2);

subplot(3,2,1); %subplot for y1
plot(x,y1)
title('Subplot 1: y1')

subplot(3,2,2); %subplot for y2
plot(x, y2)
title('Subplot 2: y2')

subplot(3,2,3);%subplot for sum
plot(x, y1+y2)
title('Subplot 3: y1+y2')

subplot(3,2,4); % subplot for difference
plot(x, y1-y2)
title('Subplot 4: y1-y2')

subplot(3,2,5) %plot all subplots on one subplot to compare
plot(x, y1)
hold on
plot(x,y2)
plot(x,y1+y2)
plot(x,y1-y2)
hold off
title('Subplot 5: Subplots 1-4 on Same Graph')
```



Part 2, ECEN 142 Step 1: for loop to sum all of the numbers from 1 to 100

```
sum=0;
for i=1:1:100
    sum=sum+i;
end
disp(sum);
```

```
        5050
```

```
%Step 2:Prints numbers from 1 to 100. For multiples of three print "Fizz", for the multiples of five print “Buzz”.
% For numbers which are multiples of both three and five print "FizzBuzz”
for i=1:1:100
    b=mod(i,3); %will equal 1 if i is not a multiple of 3
    c=mod(i,5); %will equal 1 if i is not a multiple of 5
    if (b==0)&&(c==0)  %multiple of 3 AND 5
        disp('FizzBuzz')
    elseif b==0         %multiple of 3
        disp('Fizz')
    elseif c==0         %multiple of 5
        disp('Buzz')
    else
        disp(i)
    end
end
```

```
     1

     2

Fizz
     4

Buzz
Fizz
     7

     8

Fizz
Buzz
    11

Fizz
    13

    14

FizzBuzz
    16

    17

Fizz
    19

Buzz
Fizz
    22

    23

Fizz
Buzz
    26

Fizz
    28

    29

FizzBuzz
    31

    32

Fizz
    34

Buzz
Fizz
```

```
    37

    38

Fizz
Buzz
    41

Fizz
    43

    44

FizzBuzz
    46

    47

Fizz
    49

Buzz
Fizz
    52

    53

Fizz
Buzz
    56

Fizz
    58

    59

FizzBuzz
    61

    62

Fizz
    64

Buzz
Fizz
    67

    68

Fizz
Buzz
    71

Fizz
    73

    74

FizzBuzz
    76

    77

Fizz
    79

Buzz
Fizz
    82

    83
```

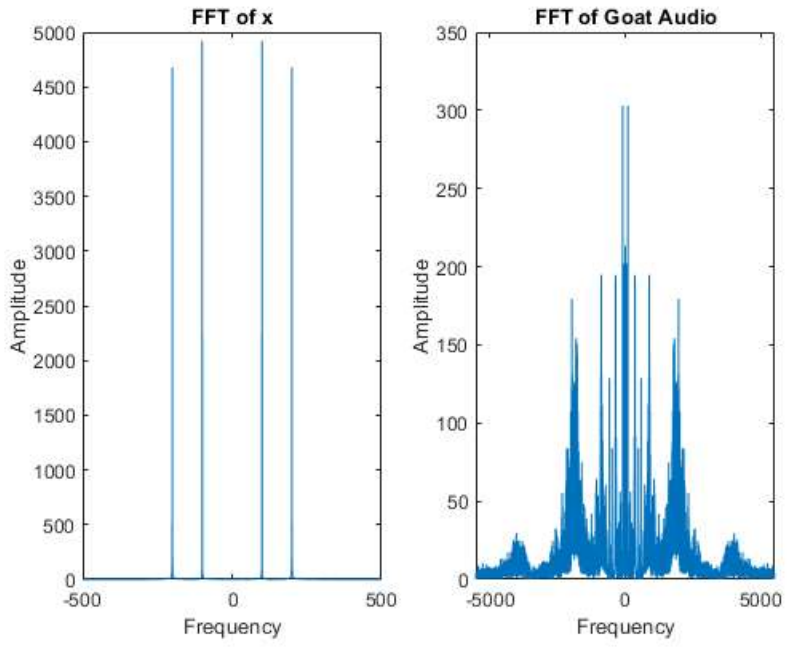
```
Fizz
Buzz
    86

Fizz
    88

    89

FizzBuzz
    91

    92

Fizz
    94

Buzz
Fizz
    97

    98

Fizz
Buzz
```

```
%Step 3: Function lab1_even_odd is defined externally. It receives argument x and returns two arrays:
%one containing all even numbers in x, the other containing all of the odd numbers.

numbers = 1:100;

[even, odd] = lab1_even_odd(numbers);

% Display the results
disp('Even numbers:');
disp(even);

disp('Odd numbers:');
disp(odd);
```

```
Even numbers:
  Columns 1 through 13

     2     4     6     8    10    12    14    16    18    20    22    24    26

  Columns 14 through 26

    28    30    32    34    36    38    40    42    44    46    48    50    52

  Columns 27 through 39

    54    56    58    60    62    64    66    68    70    72    74    76    78

  Columns 40 through 50

    80    82    84    86    88    90    92    94    96    98   100

Odd numbers:
  Columns 1 through 13

     1     3     5     7     9    11    13    15    17    19    21    23    25

  Columns 14 through 26

    27    29    31    33    35    37    39    41    43    45    47    49    51

  Columns 27 through 39

    53    55    57    59    61    63    65    67    69    71    73    75    77
```

```
  Columns 40 through 50

    79    81    83    85    87    89    91    93    95    97    99
```

```
%Lab 1 Part 3, ECEN 142

clear; clc;
Fs = 1000;
ts = 1/Fs;
t = 0:ts:10;

%Given x function
x1 = cos(2*pi*100*t); %peaks are located at -100 and +100 Hz
x2 = cos(2*pi*200*t); %peaks are located at -200 and +200 Hz
x = x1+x2;
X = fft(x);
shift = fftshift(X);
freqaxis = Fs*(linspace(-0.5,0.5,length(x)));
subplot(1,2,1);
plot(freqaxis, abs(shift));
title('FFT of x')
xlabel('Frequency');
ylabel('Amplitude');

%Goat Audio
[y, Fs] = audioread('goat.wav');
sound(y,Fs); % there is a lot of noise in this audio
Y = fft(y);
yshift = fftshift(Y);
yfreqaxis = Fs*(linspace(-0.5,0.5,length(y)));
subplot(1,2,2);
plot(yfreqaxis, abs(yshift));
title('FFT of Goat Audio')
xlabel('Frequency');
ylabel('Amplitude');
%this plot has peaks at -2000 and +2000 Hz, -1000 and +1000 Hz, and approx -100 and +100 Hz, but the signal is very distrupted by noise.
```



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