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lab4.m

```
clear
delete(allchild(0));
w = linspace(-pi, pi, 11);
x = sequence([1 4 3 -2 6], -1);
%x = sequence([1 5 2 -1 4 1], -2);
```

Problem #1: Even, Odd

```
test_lab4('even(x)');
test_lab4('odd(x)');
test_lab4('trim(plus(even(x), odd(x)))');
```

even(x): sequence O.K.

Your answer:

```
z=
    data: [3 -1  2  4  2 -1  3]
    offset: -3
```

odd(x): sequence O.K.

Your answer:

```
z=
    data: [-3  1 -1  0  1 -1  3]
    offset: -3
```

trim(plus(even(x), odd(x))): sequence O.K.

Your answer:

```
z=
    data: [1  4  3 -2  6]
    offset: -1
```

Problem #2: DTFT

```
x = sequence([1 1 1], -1);
test_lab4('dtft(x, w)');

% Simple impulse Caution! check your answer for this.
```

```

% It should be a sequence.
x = sequence(1, 0);
test_lab4('dtft(x, w)');

%x = sequence([1 4 3 -2 6], -1)
x = sequence([1 3 -1 -4 1], -2);
test_lab4('dtft(x, w)');

%x = sequence([1 4 3 -2 6], -1)
x = sequence([1+j 0 1-j], -1);
test_lab4('dtft(x, w)-dtft(conj(flip(x)), w)');

```

dtft(x, w): data O.K.
Your answer:

```

z =

Columns 1 through 7

-1.0000    -0.6180     0.3820     1.6180     2.6180     3.0000     2.6180

Columns 8 through 11

1.6180     0.3820    -0.6180    -1.0000

```

dtft(x, w): data O.K.
Your answer:

```

z =

1      1      1      1      1      1      1      1      1      1      1

```

dtft(x, w): data O.K.
Your answer:

```

z =

Columns 1 through 4

2.0000 - 0.0000i    0.4271 - 4.1145i    -2.3090 - 6.6574i    -2.9271 -
6.6574i

Columns 5 through 8

-1.1910 - 4.1145i    0.0000 + 0.0000i    -1.1910 + 4.1145i    -2.9271 +
6.6574i

Columns 9 through 11

-2.3090 + 6.6574i    0.4271 + 4.1145i    2.0000 + 0.0000i

```

```
dtfft(x, w)-dtfft(conj(flip(x)), w): data O.K.  
Your answer:
```

```
z =
```

```
0 0 0 0 0 0 0 0 0 0 0
```

Problem #3: Real and Imaginary

```
x = sequence([1 1 1 1 1], -1);  
test_lab4('dtfft2(x, w)');
```

```
%x = sequence([1 4 3 -2 6], -1);  
x = sequence([1 2 2 -1 2 1], -2);  
test_lab4('dtfft2(x, w)');
```

```
dtfft2(x, w): data O.K.  
Your answer:
```

```
z =
```

```
struct with fields:
```

```
real: [1×11 double]  
imag: [1×11 double]
```

```
dtfft2(x, w): data O.K.  
Your answer:
```

```
z =
```

```
struct with fields:
```

```
real: [3 2.4271 0.0729 -0.9271 3.4271 7 3.4271 -0.9271 0.0729  
2.4271 3]  
imag: [1×11 double]
```

Problem #4: Magnitude and Phase

```
test_lab4('mag_phase(dtfft2(x, w))');
```

```
mag_phase(dtfft2(x, w)): data O.K.  
Your answer:
```

```
z =
```

```
struct with fields:
```

```
mag: [3 3.0000 4.0294 3.0000 3.4299 7 3.4299 3.0000 4.0294
3.0000 3]
phase: [1x11 double]
```

Problem #5 Plotting

```
w = linspace(-pi, pi, 1001);
plot_magph(x, w);

% This is a purely real and even function.
% What can you say about the phase?
% Specifically why is it either 0 or pi?
x = sequence([1 1 1], -1);
set(gcf, 'Color', 'w');
plot_magph(x, w);

% This is a purely real and odd function.
% What can you say about the phase?
% Specifically why is it either +pi/2 or -pi/2?
x = sequence([-1 0 1], -1);
set(gcf, 'Color', 'w');
plot_magph(x, w);

% Here are a series of pulse functions.
% What happens to the magnitude of the transform as the pulse gets
% broader?
% You may note that the phase 'chatters' between +pi and -pi at some
% values of w.
% This doesn't look nice and it's confusing. How could you fix this in
% your plot_magph
% program so that the phase doesn't chatter? No biggie if you can't.
% (Hint: it has something to do with a very small imaginary part...).

x = sequence(ones(1, 5), -2);
set(gcf, 'Color', 'w');
plot_magph(x, w)

x = sequence(ones(1, 21), -10);
set(gcf, 'Color', 'w');
plot_magph(x, w)

x = sequence(ones(1, 101), -50);
set(gcf, 'Color', 'w');
plot_magph(x, w)
```

Print programs

```
disp(' ')
disp('--- dtft.m -----')
type('dtft')
disp('--- dtft2.m -----')
```

```
type('dtft2')
disp('--- mag_phase.m -----')
type('mag_phase')
disp('--- plot_magph.m -----')
type('plot_magph')
```

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