

Islamic University of Gaza		Signals & Linear Systems Lab
Faculty of Engineering		HW#5
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Question 1: Evaluate each of the following integrals, using both *int* and *quad*:

a) $x(t) = u(t) + 2u(t-1) - 3u(t-3)$

By Int

```

Command Window
>> syms t
>> x = heaviside(t) + 2 * heaviside(t-1) - 3 * heaviside(t-3);
>> int(x, t, 0, 3)

ans =

7

```

By Quad

```

>> syms t;
>> x = inline('hardlim(t) + 2 * hardlim(t - 1) - 3 * hardlim(t - 3)', 't');
>> quad(x, 0, 3)

ans =

7.0000

fx >> |

```

$$b) x(t) = \int_0^{\pi} \sqrt{1 + \sin(t)^2} dt$$

By Int:

```
>> syms t
>> f = sqrt(1 + sin(t) ^ 2);
>> I = int(f, t, 0, pi);
>> eval(I)

ans =

    3.8202
```

fx >> |

By quad

```
>> f = inline('sqrt(1 + sin(t) .^ 2)', 't');
>> I = quad(f, 0, pi)

I =

    3.8202
```

fx >>

Question 2: Compute the energy of the following signal using both numerical approximation (sum) and (quad) and verify your answer using (int)

$$x(t) = t \quad 0 \leq t \leq 2$$

By Sum

```
>> x = inline('t','t');  
>> t = 0:0.01:2;  
>> E_x = sum(x(t) .* x(t) .* 0.01)  
  
E_x =  
  
    2.6867
```

fx >> |

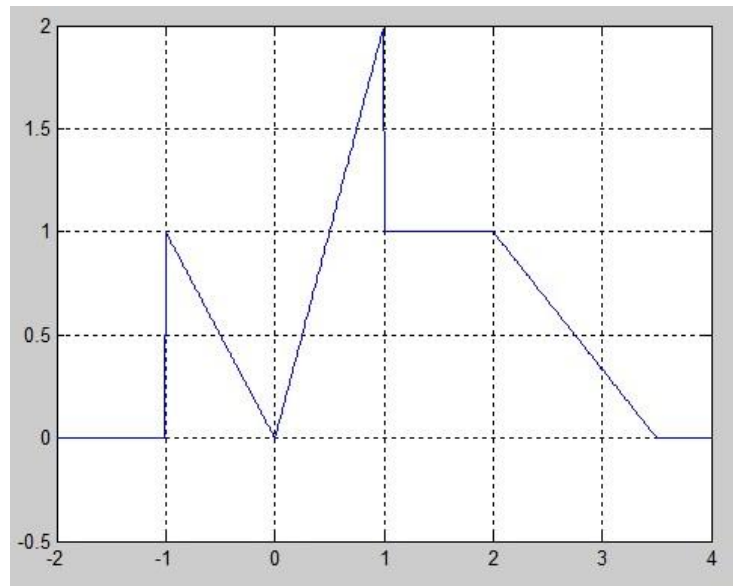
By Quad

```
>> x = inline('t','t');  
>> E_x = quad(x, 0, 2)  
  
E_x =  
  
    2.0000
```

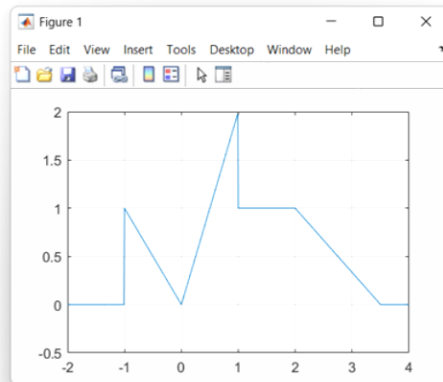
fx >> |

Question 3: For the signal shown in figure plot.

- a- $X(t-6)$
- b- $X(2t-3)$
- c- $X(-3t+5)$
- d- $X(0.5t+2)$



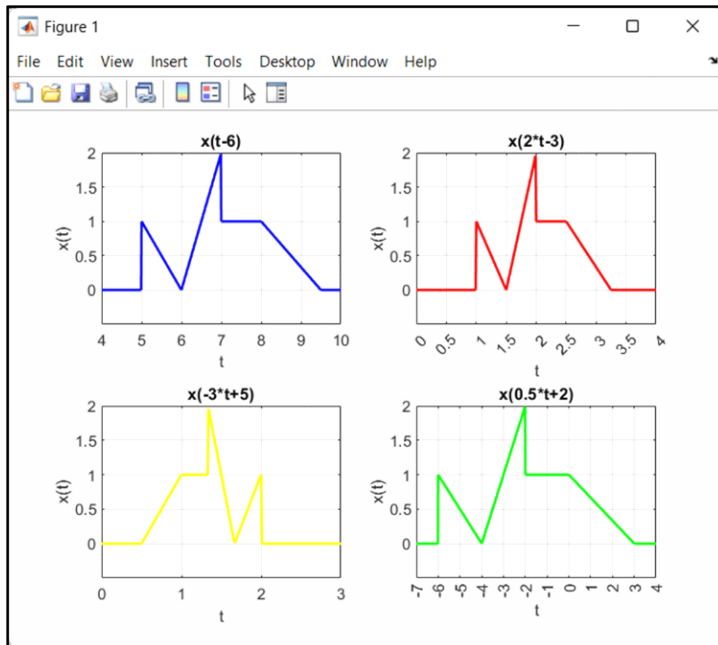
```
>> t = -10:0.01:10;
>> x = inline('hardlim(t+1)-poslin(t+1)+3*poslin(t)-2*poslin(t-1)-hardlim(t-1)-(2/3)*poslin(t-2)+(2/3)*poslin(t-3.5) ','t');
>> plot(t,x(t))
>> axis([-2 4 -0.5 2])
>> grid;
fx >>
```



```

1 t=-10:0.01:10;
2 x=inline('hardlim(t+1)-poslin(t+1)+3*poslin(t)-2*poslin(t-1)-hardlim(t-1)-(2/3)*poslin(t-2)+(2/3)*poslin(t-3.5)','t');
3 plot(t,x(t))
4 axis([-2 4 -0.5 2])
5 grid
6
7 subplot(2,2,1)
8 plot(t,x(t-6),'b','linewidth', 1.5)
9 axis([4 10 -0.5 2])
10 xticks(4:1:10)
11 yticks(0:0.5:2)
12 title('x(t-6)')
13 xlabel('t')
14 ylabel('x(t)')
15 grid;
16
17 subplot(2,2,2)
18 plot(t,x(2*t-3),'r','linewidth', 1.5)
19 axis([0 4 -0.5 2])
20 xticks(0:0.5:4)
21 yticks(0:0.5:2)
22 title('x(2*t-3)')
23 xlabel('t')
24 ylabel('x(t)')
25 grid;
26
27 subplot(2,2,3)
28 plot(t,x(-3*t+5),'y','linewidth', 1.5)
29 axis([0 3 -0.5 2])
30 xticks(0:1:3)
31 yticks(0:0.5:2)
32 title('x(-3*t+5)')
33 xlabel('t')
34 ylabel('x(t)')
35 grid;
36
37 subplot(2,2,4)
38 plot(t,x(0.5*t+2),'g','linewidth', 1.5)
39 axis([-7 4 -0.5 2])
40 xticks(-7:1:4)
41 yticks(0:0.5:2)
42 title('x(0.5*t+2)')
43 xlabel('t')
44 ylabel('x(t)')
45 grid;
46

```



```

t=-10:0.01:10;
x=inline('hardlim(t+1)-poslin(t+1)+3*poslin(t)-2*poslin(t-1)-hardlim(t-1)-
(2/3)*poslin(t-2)+(2/3)*poslin(t-3.5)','t');
plot(t,x(t))
axis([-2 4 -0.5 2])
grid

subplot(2,2,1)
plot(t,x(t-6),'b','linewidth', 1.5)
axis([4 10 -0.5 2])
xticks(4:1:10)
yticks(0:0.5:2)
title('x(t-6)')
xlabel('t')
ylabel("x(t)")
grid;

subplot(2,2,2)
plot(t,x(2*t-3),'r','linewidth', 1.5)
axis([0 4 -0.5 2])
xticks(0:0.5:4)
yticks(0:0.5:2)
title('x(2*t-3)')
xlabel('t')
ylabel("x(t)")
grid;

subplot(2,2,3)
plot(t,x(-3*t+5),'y','linewidth', 1.5)
axis([0 3 -0.5 2])
xticks(0:1:3)
yticks(0:0.5:2)
title('x(-3*t+5)')
xlabel('t')
ylabel("x(t)")
grid;

subplot(2,2,4)
plot(t,x(0.5*t+2),'g','linewidth', 1.5)
axis([-7 4 -0.5 2])
xticks(-7:1:4)
yticks(0:0.5:2)
title('x(0.5*t+2)')
xlabel('t')
ylabel("x(t)")
grid;

```