Matlab 7^{th} Homework

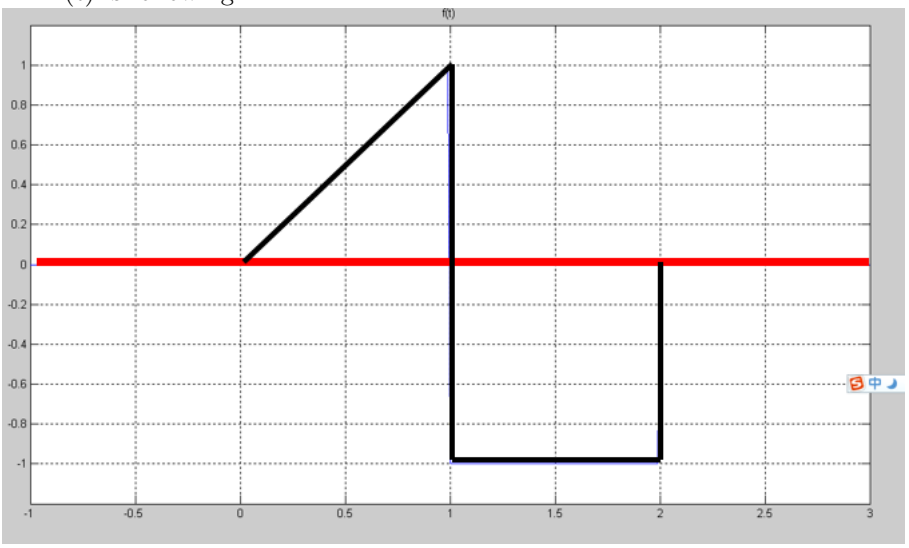
庄震丰 22920182204393

NOV. 14^{th}, 2019

1 Plot Signal Curves

1.1 Description

f(t) is following:



plot:

$$f(t)+f(t)$$
$$f(t)\cdot f(t)$$
$$f(3-4t)$$
$$f(1-\frac{t}{1.5})$$
$$f(t)f(3-4t)$$
$$f'(t)$$
$$\int f(t)$$
$$odd-evencomponentof f(t)$$

1.2 Analysis

To generate step function u(t),use **stepfun()** or **heaviside()**.
For numberical solution, f'(t) must use $lim_{x->\delta x}\frac{f(x+\delta x)-f(x)}{\delta x}$,integration must

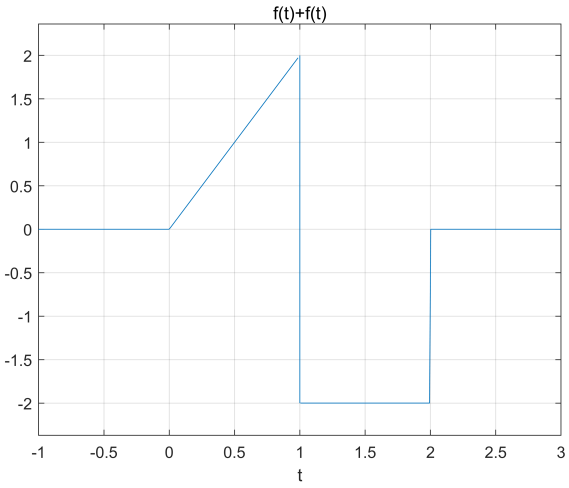
use sum function.

1.3 Codes and Result

symbolic solution

```
clear all
close all
syms t;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside(t-2));
ezplot(f+f,[-1,3]);
line([1,1],[-2,2])
hold on;
grid on;
title('f(t)+f(t)');
```

Result

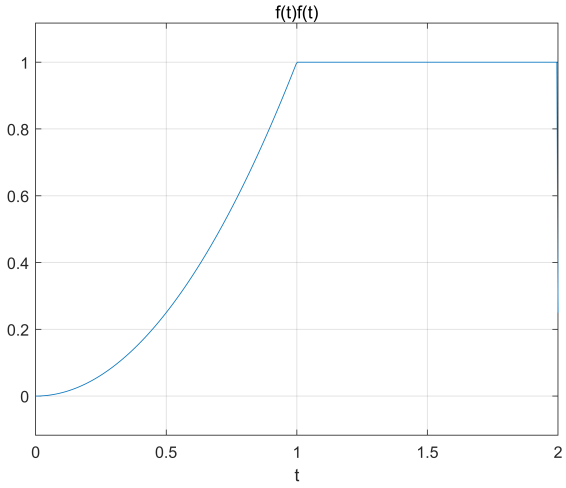


Question 2

```
clear all
close all
syms t;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside(t-2));
ezplot(f*f);
hold on;
```

```
7       grid on;
8       title('f(t)f(t)');
```

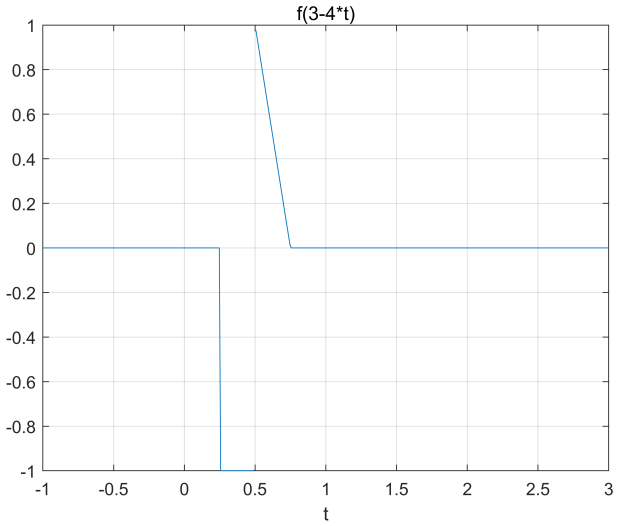
Result



Question 3

```
1       clear all
2       close all
3       syms t;
4       f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside
            (t-2));
5       ezplot(subs(f,t,3-4*t));
6       hold on;
7       grid on;
8       title('f(3-4t)');
```

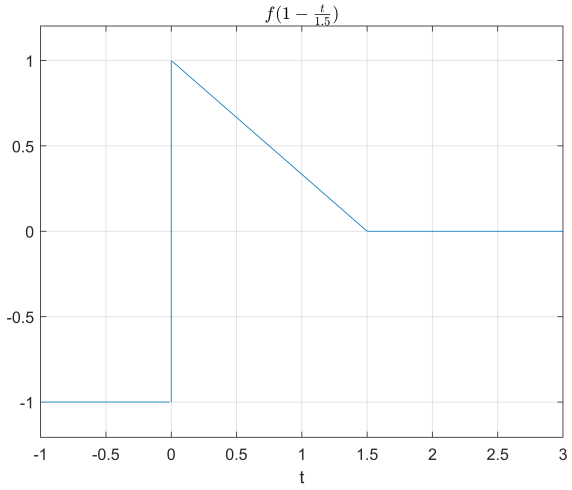
Result



Question 4

```
clf;
syms t;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside
    (t-2));
ezplot(subs(f,t,1-t/1.5),[-1,3]);
line([0,0],[-1,1])
hold on;
grid on;
title("$f(1-\frac{t}{1.5})$",'Interpreter','Latex');
```

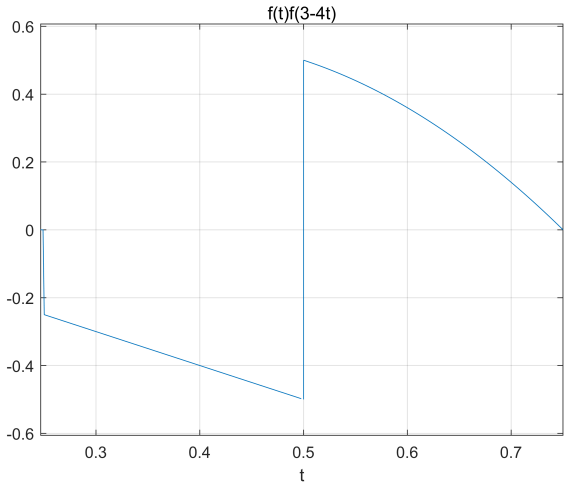
Result



Question 5

```
clear all
close all
syms t;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside(t
    -2));
ezplot(f*subs(f,t,3-4*t));
line([0.5,0.5],[-0.5,0.5])
hold on;
grid on;
title('f(t)f(3-4t)');
```

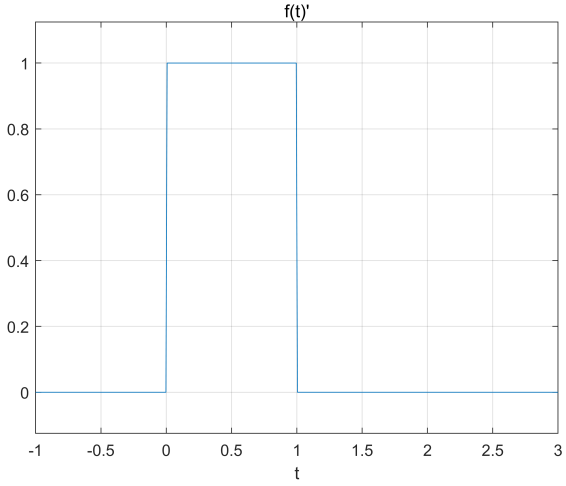
Result



Question 6

```
clear all
close all
syms t;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside
    (t-2));
ezplot(diff(f,t));
line([0.5,0.5],[-0.5,0.5])
hold on;
grid on;
title("f(t)'");
```

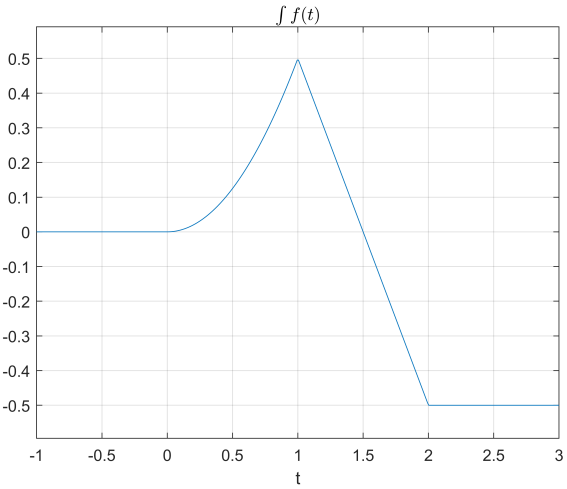
Result



Question 7

```
clf;
syms t;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside
    (t-2));
ezplot(int(f,t,-inf,t),[-1,3]);
%line([],[])
hold on;
grid on;
title("$\int f(t)$",'Interpreter','Latex');
```

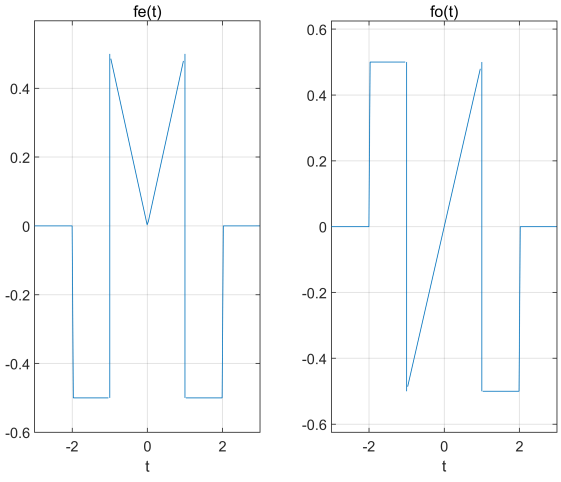
Result



Question 8

```
clf;
syms t;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside
    (t-2));
fe=(f+subs(f,t,-t))/2;
fo=(f-subs(f,t,-t))/2;
subplot(1,2,1);
ezplot(fe,[-3,3]);
hold on;
line([-1,-1],[-0.5,0.5]);
line([1,1],[-0.5,0.5]);
grid on;
title('fe(t)')
subplot(1,2,2);
ezplot(fo,[-3,3]);
hold on;
line([1,1],[-0.5,0.5]);
line([-1,-1],[-0.5,0.5]);
title('fo(t)')
grid on;
```

Result



Numberical method

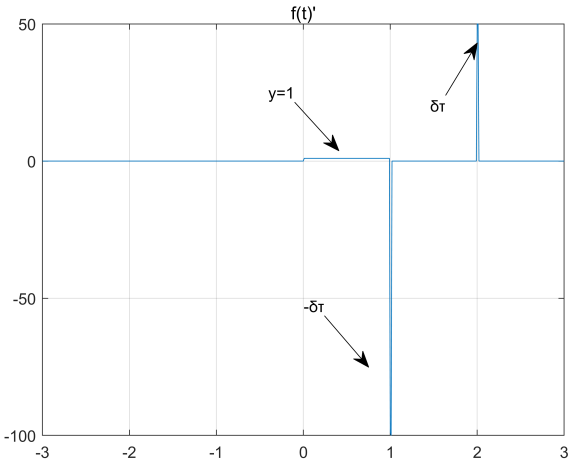
```
`
```

```
1
clear all
close all
t=-3:0.01:3;
f=(heaviside(t)-heaviside(t-1)).*t-(heaviside(t-1)-heaviside(t
    -2));
plot(t,f);
axis([-3,3,-2,2])
line([1,1],[-2,2])
hold on;
grid on;
title('f(t)+f(t)');
2
clear all
close all
t=-3:0.01:3;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside(t
    -2));
plot(t,f.*f);
hold on;
grid on;
title('f(t)f(t)');、
3
clear all
close all
t;
f=(heaviside(t)-heaviside(t-1))*t-(heaviside(t-1)-heaviside(t
    -2));
ezplot(subs(f,t,3-4*t));
hold on;
grid on;
title('f(3-4t)');、
4
clf;
t=-3:0.01:3;
f=(heaviside(3-4*t)-heaviside(3-4*t-1)).*t-(heaviside(3-4*t-1)-
    heaviside(3-4*t-2));
plot(t,f);
hold on;
grid on;
title("f(1-\frac{t}{1.5})",'Interpreter','Latex');、
5
```

```
clear all
close all
t=-3:0.01:3;
f=(heaviside(t)-heaviside(t-1)).*t-(heaviside(t-1)-heaviside(t
    -2)).*(heaviside(3-4*t)-heaviside(3-4*t-1)).*t-(heaviside
    (3-4*t-1)-heaviside(3-4*t-2));
plot(t,f);
hold on;
line([0.5,0.5],[-0.5,0.5])
grid on;
title('f(t)f(3-4t)');、
6
t=-3:0.01:3;
f=(heaviside(t)-heaviside(t-1)).*t-(heaviside(t-1)-heaviside(t
    -2));
for i=-3:0.01:3
    if i~=-3
        y(round((i+3)/0.01)+1)=(f(round((i+3)/0.01)+1)-f(round
            ((i+3)/0.01)))/0.01;
    else y(1)=(f(1)-0)/0.01;
    end

end
plot(t,y);
hold on;
grid on;
title("f(t)'");、
7
clf;
t=-3:0.01:3;
f=(heaviside(t)-heaviside(t-1)).*t-(heaviside(t-1)-heaviside(t
    -2));
for i=-3:0.01:3
    f1(round((i+3)/0.01+1))=sum(f(1:round((i+3)/0.01)+1))*0.01;
end
plot(t,f1);
%line([],[])
hold on;
grid on;
title("∫f(t)",'Interpreter','Latex');、
8
clf;
```

```
77 t=-3:0.01:3;
78 f=(heaviside(t)-heaviside(t-1)).*t-(heaviside(t-1)-heaviside(t
       -2));
79 fe=(f+fliplr(f))/2;
80 fo=(f-fliplr(f))/2;
81 subplot(1,2,1);
82 plot(t,fe);
83 hold on;
84 axis([-3,3,-1,1])
85 grid on;
86 title('fe(t)')
87 subplot(1,2,2);
88 plot(t,fo);
89 hold on;
90 %line([1,1],[-0.5,0.5]);
91 %line([-1,-1],[-0.5,0.5]);
92 title('fo(t)')
93 axis([-3,3,-1,1]);
94 grid on;
```



numberical solution for T6 shows δt on the figure.

2 Plot f

2.1 Description

$f = \frac{sin(\pi t)}{t}$,plot figures as follow.

$$\begin{array}{cc} 2f(t-1) & f(2t) \\ -f(0.25t) & f(1-0.5t) \end{array}$$

2.2 Anaylsis

use function **subplot(),plot,ezplot()** .

2.3 Code and Result

```
%Numberical method
t=-10:0.01:10;
subplot(2,2,1);
f=2*sinc(t-1)*pi;
plot(t,f);
hold on;
grid on;
title('2f(t-1)');
subplot(2,2,2);
f=sinc(2*t)*pi;
plot(t,f);
hold on;
grid on;
title('f(2t)');
subplot(2,2,3);
f=-sinc(0.25*t)*pi;
plot(t,f)
hold on;
grid on;
title('-f(0.25t)');
subplot(2,2,4);
f=sinc(1-0.5*t)*pi;
plot(t,f);
hold on;
grid on;
title('f(1-0.5t)')
```

symbolic solution

```
    f=sinc(t)*pi;
    subplot(2,2,1);
```

```
3       ezplot(2*subs(f,t,t-1));
4       hold on;
5       grid on;
6       title('2f(t-1)');
7       subplot(2,2,2);
8       ezplot(2*subs(f,t,2*t));
9       hold on;
10      grid on;
11      title('f(2t)');
12      subplot(2,2,3);
13      ezplot(-subs(f,t,0.25*t));
14      hold on;
15      grid on;
16      title('-f(0.25t)');
17      subplot(2,2,4);
18      ezplot(subs(f,t,1-0.5*t));
19      hold on;
20      grid on;
21      title('f(1-0.5t)')
```

Result