Necula Madalina Andreea
422D

Tema PSP-Convolutia Semnalelor

Exemplul1:

| T3.ex1.m ☒ | T3.ex2.m ☒ | T3.1.m ☒ | T3.2.m ☒ | T3.3.m ☒ | T3.5.m ☒ |

```matlab
1   clc;
2   clear all;
3   close all;
4
5   tstart = 0;
6   tstop = 0.1;
7   tpas = 0.0001;
8
9   t = tstart : tpas : tstop;
10  x = ones(1,1001);
11
12  subplot(3, 1, 1);
13  plot(t, x, 'linewidth', 3);
14  axis([-0.101 0.201 0 1.2]); grid;
15
16  tstop3 = 0.05;
17  t3 = tstart : tpas : tstop3;
18  h = ones(1,501);
19  subplot(3, 1, 2);
20  plot(t3, h, 'linewidth', 3);
21  axis([-0.101 0.201 0 1.2]); grid;
22
23  t2 = 2*tstart : tpas : tstop+tstop3;
24  y = conv(h, x)*tpas;
25
26  subplot(3, 1, 3);
27  plot(t2, y, 'r', 'linewidth', 3);
28  axis([-0.101 0.201 ]); grid;
29
30  %%reprezentarea grafica a convolutiei semnalelor dreptunghiulare
31  %%este un trapez intrucat bazele celor doua semnale nu sunt egale
```

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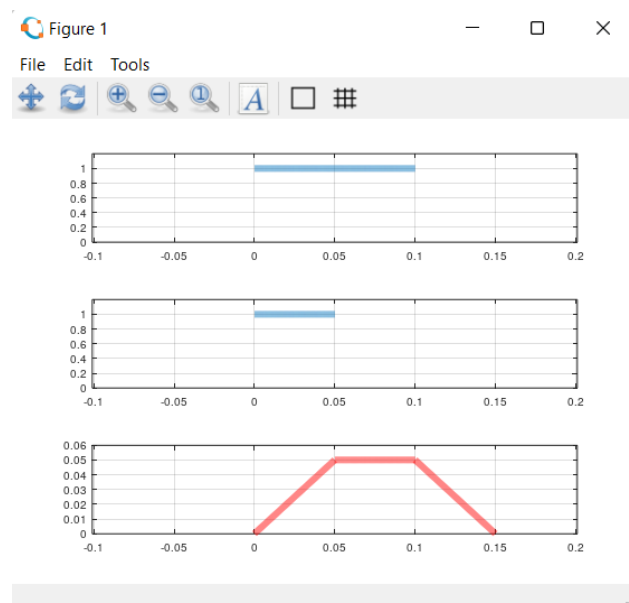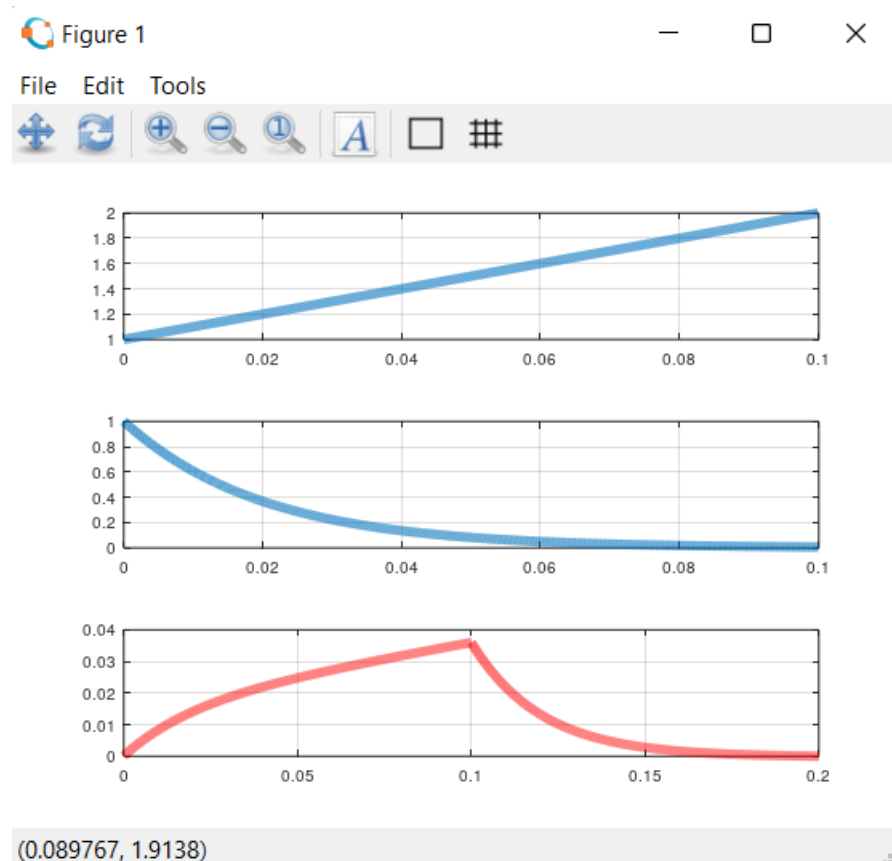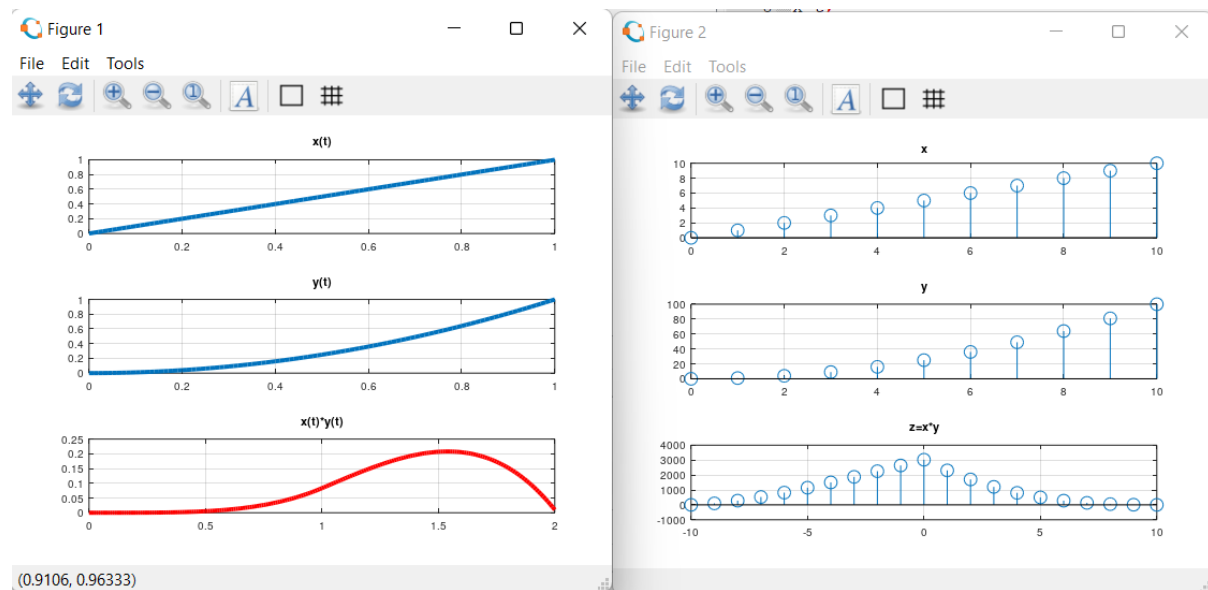**Exemplul2:**

```
T3.ex1.m    T3.ex2.m    T3.1.m    T3.2.m    T3.3.m    T3.5.m

 1  clc;
 2  clear all;
 3  close all;
 4
 5  tstart = 0;
 6  tstop = 0.1;
 7  tpas = 0.0001;
 8  f=50 %pentru o variatie exponentiala mai lina trebuie micsorata valoarea lui f
 9
10  t = tstart : tpas : tstop;
11  x = 1+10*t; %am modificat semnul coeficientului lui t
12             %pt ca semnalul sa fie crescator
13  subplot(3, 1, 1);
14  plot(t, x, 'linewidth', 3);
15  axis([0 0.1001 1 2]); grid;
16
17  h = 1*exp(-f*t);
18  subplot(3, 1, 2);
19  plot(t, h, 'linewidth', 3);
20  axis([0 0.1001 0 1]); grid;
21
22  t2 = 2*tstart : tpas : tstop*2;
23  y = conv(h, x) *tpas;
24
25  subplot(3, 1, 3);
26  plot(t2, y, 'r', 'linewidth', 3);
27  axis(); grid;
```
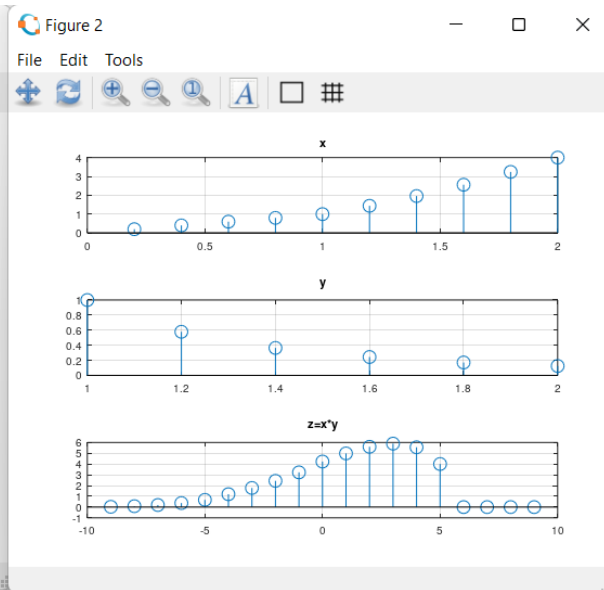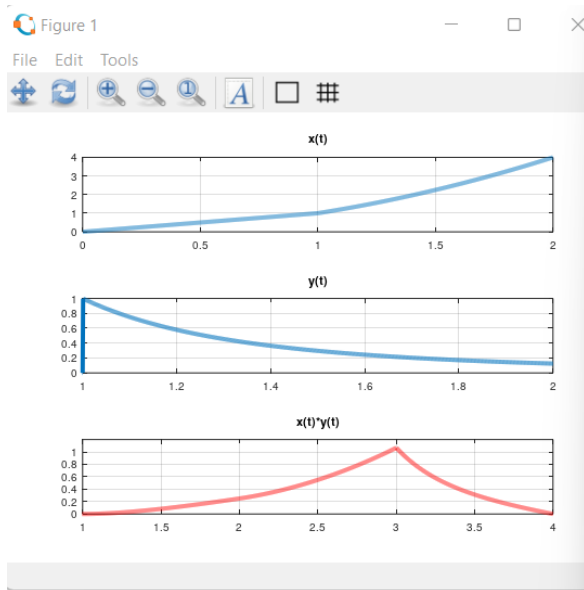

Figure 1

File Edit Tools

(0.089767, 1.9138)

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Problema1:

T3.ex1.m ☒	T3.ex2.m ☒	T3.1.m ☒	T3.2.m ☒	T3.3.m ☒	T3.5.m ☒

```
1   clc;
2   clear all;
3   close all;
4   pkg load signal;
5
6   figure(1);
7   t= 0: 0.01: 1;
8   x=t;
9
10  subplot (3,1,1);
11  plot(t,x,'linewidth',2);
12  title('x(t)');
13  grid;
14
15  h=(t).^2;
16  subplot(3,1,2);
17  plot(t,h,'linewidth',2);
18  title('y(t)');
19  grid;
20
21  t2= 0: 0.01: 2;
22  y=conv(x,h)*0.01;
23
24  subplot(3,1,3);
25  plot(t2,y,'r','linewidth',2);
26  title('x(t)*y(t)')
27  axis(); grid;
28
29  figure(2);
30  n=0:10;
31  x=n;
32  y=n.*n;
33  [z, intarziere]=xcorr(x,y);
34
35  subplot(3,1,1);

36  stem(n,x);
37  axis(); grid;
38  title(['x']);
39
40  subplot(3,1,2);
41  stem(n,y);
42  axis(); grid;
43  title(['y']);
44
45  subplot(3,1,3);
46  stem(intarziere,z);
47  axis(); grid;
48  title(['z=x*y']);
```
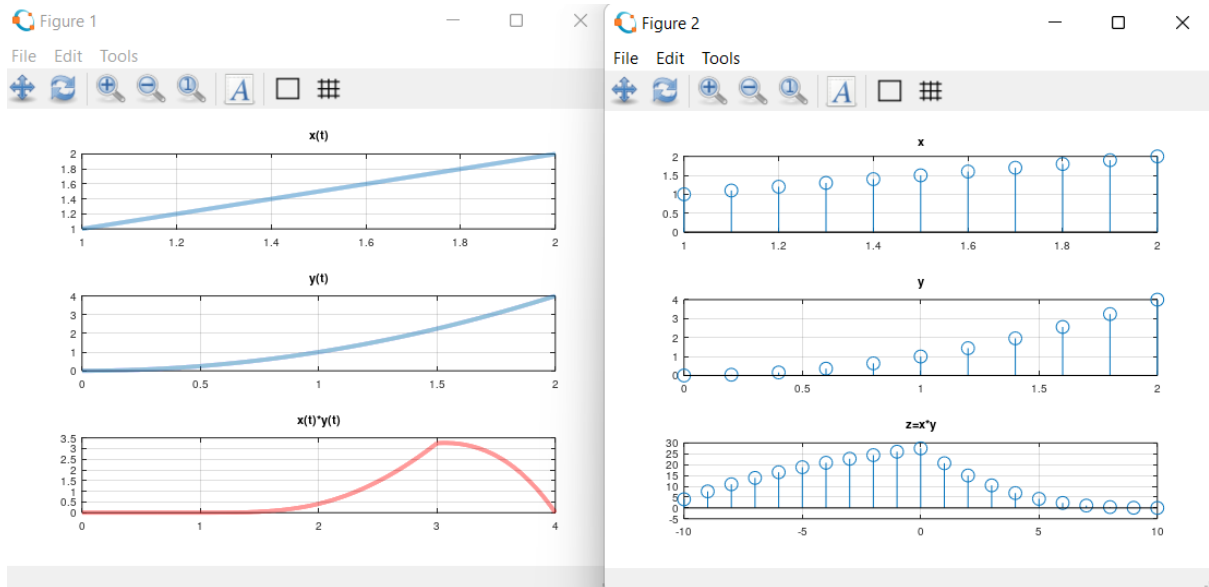
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(0.9106, 0.96333)

Problema2:

Tabs: T3.ex1.m | T3.ex2.m | T3.1.m | T3.2.m | T3.3.m | T3.5.m

```matlab
clc;
clear all;
close all;
pkg load signal;

figure(1);
t=0.001: 0.001: 2;
x=t.*(t<=1) + t.*t.*(1<t);
y=(t.^(-3)).*(t>1);

subplot (3,1,1);
plot(t,x, 'linewidth',2);
title('x(t)');
grid;

subplot(3,1,2);
plot(t,y,'linewidth',2);
title('y(t)');
axis([1 2 0 1]);grid;

t2= 0.002: 0.001: 4;
h=conv(x, y)*0.001;

subplot(3,1,3);
plot(t2,h,'r','linewidth',2);
title('x(t)*y(t)');
axis([1 4 0 1.2]);grid;

figure(2);
n=0.2: 0.2: 2;
x=n.*(n<=1)+(n.*n).*(n>1);
y=(((n).^(-3)).*(n>=1));
[z, intarziere]=xcorr(x,y);
```

```
34
35  subplot(3,1,1);
36  stem(n,x);
37  axis();grid; title(['x']);
38
39  subplot(3,1,2);
40  stem(n,y);
41  axis([1 2 0 1]);grid; title(['y']);
42
43  subplot(3,1,3);
44  stem(intarziere,z);
45  axis(); grid;
46  title(['z=x*y']);
```

Problema3:

T3.ex1.m ⊠	T3.ex2.m ⊠	T3.1.m ⊠	T3.2.m ⊠	T3.3.m ⊠	T3.5.m ⊠

```matlab
1  clc;
2  clear all;
3  close all;
4  pkg load signal;
5
6  figure(1);
7  t= 0: 0.0001: 2;
8  x=t.*(t>=1);
9  y=t.^2;
10
11 subplot (3,1,1);
12 plot(t,x,'linewidth',2);
13 title('x(t)');
14 axis([1 2 1 2]);
15 grid;
16
17 subplot(3,1,2);
18 plot(t,y,'linewidth',2);
19 title('y(t)');
20 grid;
21
22 t2= 0: 0.0001: 4;
23 h=conv(x, y)*0.0001;
24
25 subplot(3,1,3);
26 plot(t2,h,'r','linewidth',2);
27 title('x(t)*y(t)')
28 axis(); grid;
29
30 figure(2);
31 n=1: 0.1: 2;
32 x=n.*(1<=n).*(n<=2);
33 n_h=0: 0.2: 2;
```

```matlab
34 y=n_h.*n_h;
35 [z, intarziere]=xcorr(x,y);
36
37 subplot(3,1,1);
38 stem(n,x);
39 axis(); grid;
40 title(['x']);
41
42 subplot(3,1,2);
43 stem(n_h,y);
44 axis(); grid;
45 title(['y']);
46
47 subplot(3,1,3);
48 stem(intarziere,z);
49 axis(); grid;
50 title(['z=x*y']);
```

Problema5:

$$5. \; x(t) = a \cdot t + b; \; t \in [0,1] \quad a.2 \; x(0) = 0; \; x(1) = 4$$
$$y(t) = c \cdot t + d; \; t \in [1,2] \quad a.2 \; y(1) = 3, \; y(2) = 0$$

$$x(t) = a \cdot t + b$$
$$x(0) = 0 \Rightarrow a \cdot 0 + b = 0 \Rightarrow b = 0$$
$$x(1) = 4 \Rightarrow a \cdot 1 + b = 4 \Rightarrow a = 4$$
$$x(t) = 4t + 0 \Rightarrow x(t) = 4t$$

$$y(t) = c \cdot t + d$$
$$y(1) = 3 \Rightarrow c \cdot 1 + d = 3$$
$$y(2) = 0 \Rightarrow c \cdot 2 + d = 0 \Rightarrow \begin{cases} c + d = 3 \\ 2c + d = 0 \end{cases} \Rightarrow c = 3$$

$$c + d = 3 \Rightarrow d = 6$$

$$y(t) = -3t + 6$$

T3.ex1.m ✕	T3.ex2.m ✕	T3.1.m ✕	T3.2.m ✕	T3.3.m ✕	T3.5.m ✕

```
 1  clc;
 2  clear all;
 3  close all;
 4  pkg load signal;
 5
 6  figure(1);
 7  t=0: 0.0001: 2;
 8  x=4.*t.*(t<=1);
 9  y=(-3.*t+6).*(t>=1);
10
11  subplot (3,1,1);
12  plot(t,x, 'linewidth',2);
13  title('x(t)');
14  axis([0 1 0 4]);grid;
15
16  subplot(3,1,2);
17  plot(t,y,'linewidth',2);
18  title('y(t)');
19  axis([1 2 0 3]);grid;
20
21  t2= 0: 0.0001: 4;
22  h=conv(x, y)*0.0001;
23
24  subplot(3,1,3);
25  plot(t2,h,'r','linewidth',2);
26  title('x(t)*y(t)');
27  axis();grid;
28
29  figure(2);
30  n=0: 0.1: 2;
31  x=4.*n.*(n<=1);
32  y=(-3.*n+6).*(n>=1);
33  [z, intarziere]=xcorr(x,y);
34
35  subplot(3,1,1);
36  stem(n,x);
37  axis([0 1 0 4]);grid;
38  title(['x']);
39
40  subplot(3,1,2);
41  stem(n,y);
42  axis([1 2 0 3]);grid;
43  title(['y']);
44
45  subplot(3,1,3);
46  stem(intarziere,z);
47  axis(); grid;
48  title(['z=x*y']);
49
```

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