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clc
clear all
close all

%% Exercițiul 1
% 1
figure(1)
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10;
i = -A * u0(t);
subplot(3,3,1);
plot(t,i,'LineWidth',2); grid; xlabel('t');

% 2
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10; T = 2;
i = -A * u0(t-T);
subplot(3,3,2);
plot(t,i,'LineWidth',2); grid; xlabel('t');

% 3
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10; T = 2;
i = -A * u0(t+T);
subplot(3,3,3);
plot(t,i,'LineWidth',2); grid; xlabel('t');

% 4
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10;
i = A * u0(-t);
subplot(3,3,4);
plot(t,i,'LineWidth',2); grid; xlabel('t');

% 5
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10; T = 2; xlabel('t');
i = A * u0(-t+T);
subplot(3,3,5);
plot(t,i,'LineWidth',2); grid; xlabel('t');

% 6
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10; T = 2;
i = A * u0(-t-T);
subplot(3,3,6);
plot(t,i,'LineWidth',2); grid;

% 7
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10;
i = -A * u0(-t);
subplot(3,3,7);
plot(t,i,'LineWidth',2); grid; xlabel('t');

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% 8
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10; T = 2;
i = -A * u0(-t+T);
subplot(3,3,8);
plot(t,i,'LineWidth',2); grid; xlabel('t');
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% 9
u0 = @(t)(t>=0);
A = 2; t = -10:0.1:10; T = 2;
i = -A * u0(-t-T);
subplot(3,3,9);
plot(t,i,'LineWidth',2); grid; xlabel('t');
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$$1) e^{-t} \cos(10t) \delta(t) \xrightarrow{\text{propriedade de pontilhado}}$$

$$= e^{-0} \cos(10 \cdot 0) \delta(t)$$

$$= \delta(t)$$

$$p.c) \sin(2\pi x) \sum_{k=0}^{\infty} \delta(x-k), k \in \mathbb{Z}$$

$$= \sin(2\pi x) u(x)$$

Tema 6

2)

$$a) \int_{-\pi}^{\pi} \sin(\pi t) \delta(t-1) dt$$

propriedade de semente

$$\int_{-\pi}^{\pi} \sin(\pi t) \delta(t-1) dt = \sin(\pi) = 0$$

$$b) \int_0^2 \sin(\pi t) \delta(t-3) dt$$

propriedade de semente

$$\int_0^2 \sin(\pi t) \delta(t-3) dt = \sin(3\pi) = 0$$

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%% Exercițiul 3
% semnalul
u0 = @(n)(n>=0);
n = -6:1:6;
x = @(n)(n/2 .* (u0(n+4) - u0(n-5)));
figure(3);
stem(n,x(n),'LineWidth',2); grid;
xlabel('n');ylabel('x[n]');

% a
figure(4);

subplot(3,3,1);
stem(n,x(2-n),'LineWidth',2); grid;
xlabel('n');ylabel('x[2-n]'); title('a');

% b
subplot(3,3,2);
stem(n,x(n+2),'LineWidth',2); grid;
xlabel('n');ylabel('x[n+2]'); title('b');

% c
subplot(3,3,3);
stem(n,u0(n) .* x(-n) + x(n),'LineWidth',2); grid;
xlabel('n');ylabel('x[-n]u[n]+x[n]'); title('c');

% d
subplot(3,3,4);
stem(n,x(n+2) + x(-1-n),'LineWidth',2); grid;
xlabel('n');ylabel('x[n+2]+x[-1-n]'); title('d');

% e
d = @(n)(n==0);
subplot(3,3,5);
stem(n,x(3*n).*d(n-1),'LineWidth',2); grid;
xlabel('n');ylabel('x[3n]\delta[n-1]'); title('e');

% f
subplot(3,3,6);
stem(n,x(n+1).*(u0(n+3)-u0(-n)),'LineWidth',2); grid;
xlabel('n');ylabel('x[n+1](u[n+3]-u0[-n])'); title('f');

% g
subplot(3,3,8);
stem(n,(u0(n-4)-u0(n-3)).*x(n),'LineWidth',2); grid;
xlabel('n');ylabel('(u[n-4]-u[n-3])x[n]'); title('g');

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