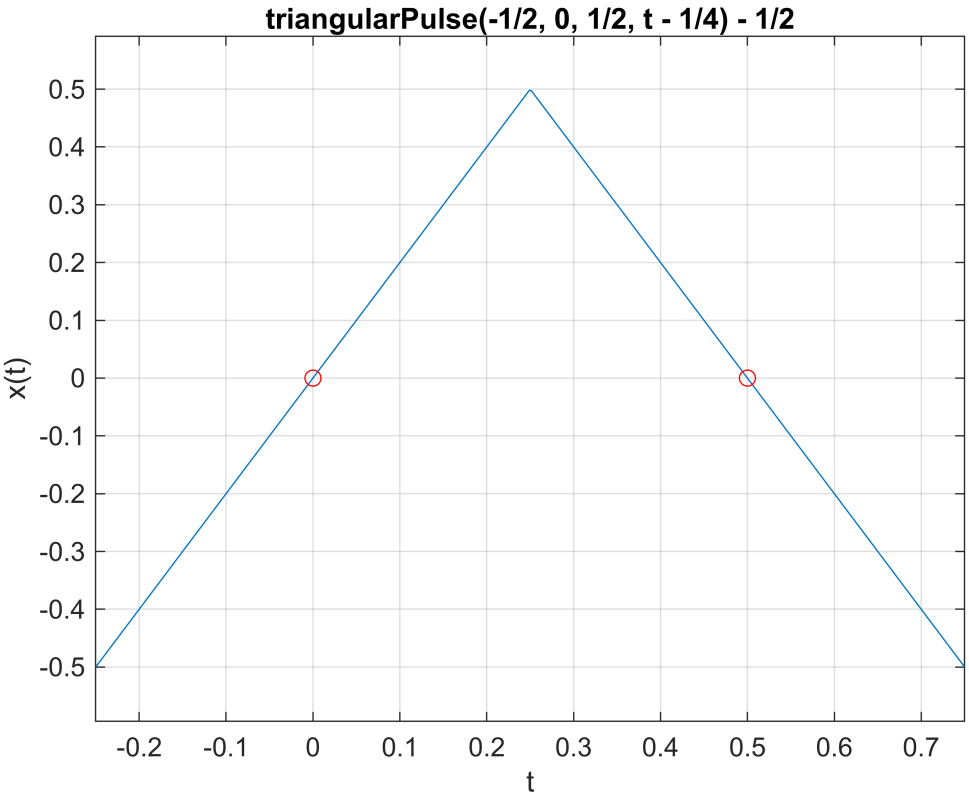
Zadanie 1

```
clear all; close all;

syms t t1 t2 offset x

T0 = 1.0;        % okres
t1 = -0.5;
t2 = t1+T0;
offset = T0/4;

f0 = 1/T0;        % czestotliwosc
w0 = 2*pi*f0;    % pulsacja

% granice ca³kowania
BND = [t1,t2] + offset;

x = triangularPulse(t1,0,t2,t-offset)-0.5;
idx = find(diff(sign(x)) ~= 0);
value=x(idx)
```

```
value =
```

$$\text{triangularPulse}\left(-\frac{1}{2},0,\frac{1}{2},t-\frac{1}{4}\right)-\frac{1}{2}$$

```
figure;

ezplot(x,BND);
grid on;
ylabel('x(t)');
hold on
plot([0,0.5],0,'ro')
```



Zadnie 2

```
NT = 16;
X=[];
ind = -NT : NT;
for n = ind
Xn = (1/T0)*int(x*exp(-i*w0*n*t),t,BND)
X(n + NT + 1) = Xn;
end
```

Xn = 0

Xn =

$$-\frac{2\,\mathrm{i}}{225\,\pi^2}$$

Xn = 0

Xn =

$$\frac{2\,\mathrm{i}}{169\,\pi^2}$$

Xn = 0

Xn =

$$-\frac{2\,\mathrm{i}}{121\,\pi^2}$$

Xn = 0

Xn =

$$\frac{2\,i}{81\,\pi^2}$$

Xn = 0

Xn =

$$-\frac{2\,i}{49\,\pi^2}$$

Xn = 0

Xn =

$$\frac{2\,i}{25\,\pi^2}$$

Xn = 0

Xn =

$$-\frac{2\,i}{9\,\pi^2}$$

Xn = 0

Xn =

$$\frac{2\,i}{\pi^2}$$

Xn = 0

Xn =

$$-\frac{2\,i}{\pi^2}$$

Xn = 0

Xn =

$$\frac{2\,i}{9\,\pi^2}$$

Xn = 0

Xn =

$$-\frac{2\,i}{25\,\pi^2}$$

Xn = 0

Xn =

$$\frac{2\,i}{49\,\pi^2}$$

Xn = 0

Xn =

$$-\frac{2\,i}{81\,\pi^2}$$

Xn = 0

Xn =

$$\frac{2\,i}{121\,\pi^2}$$

Xn = 0

Xn =

$$-\frac{2\,\mathrm{i}}{169\,\pi^2}$$

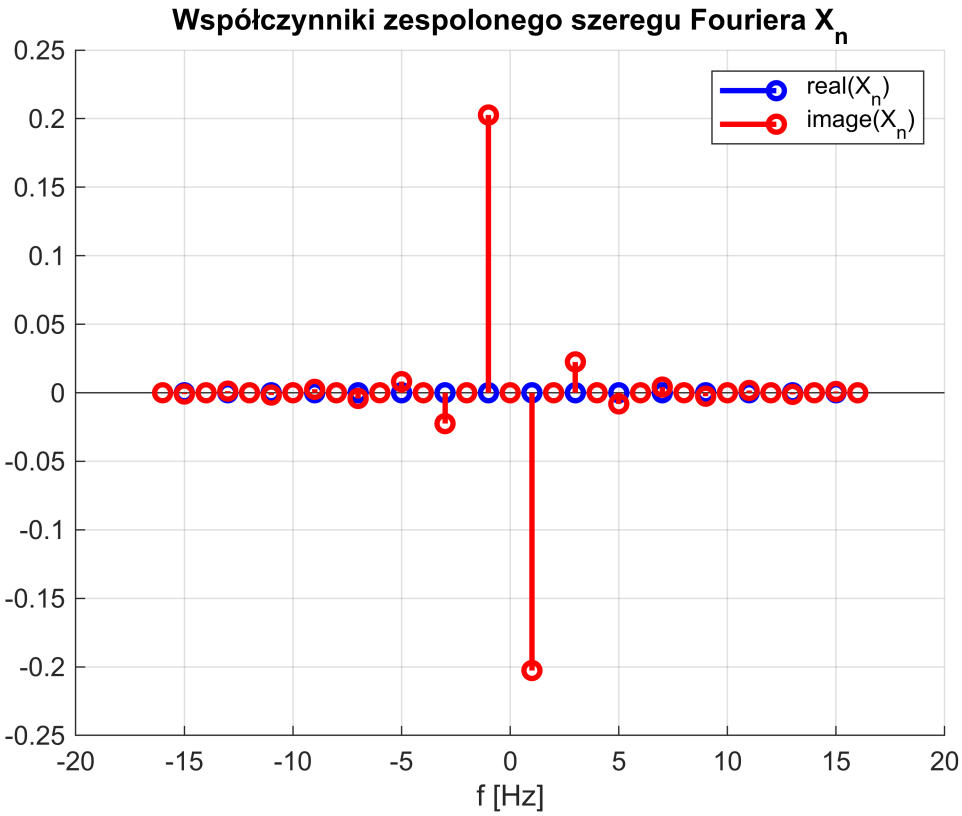
Xn = 0

Xn =

$$\frac{2\,\mathrm{i}}{225\,\pi^2}$$

Xn = 0

```
figure; hold on;
stem(ind*f0,real(X),'b','LineWidth',2);
xlabel('f [Hz]')
stem(ind*f0,imag(X),'r','LineWidth',2);
grid on
legend('real(X_n)','image(X_n)','Location','NorthEast')
title('Współczynniki zespolonego szeregu Fouriera X_n')
```



Zadanie 3

```
NT = 16;
X=[];
An=[];
```

```
Bn=[];
ind = -NT : NT;
for i = ind
An(i)=(1/T0)*int(x*cos(-w0*i*t),t,BND)
Bn(i)=(1/T0)*int(x*sin(-w0*i*t),t,BND)
X(i+NT+1) = [An,Bn]
end
```

```
Array indices must be positive integers or logical values.
```

```
stem(ind*f0,real(X),'b','LineWidth',2);
xlabel('f [Hz]')
stem(ind*f0,imag(X),'r','LineWidth',2);
grid on
```

```
step = (BND(2) - BND(1))/1000;
tt = [BND(1)-T0 : step: BND(2) + T0];
xx = zeros(1,length(tt));
xx = xx + a(1); % skladowa stala
```

```
Unrecognized function or variable 'a'.
```

```
figure
plot(tt,xx,'m'); grid on, hold on;
plot([0,0],[-0.6,0.6],'w.')
xlabel('t'); ylabel('x(t)');
pause(0.5)
for n = 1 : NT
xx_n = 2*(a(n+1)*cos(w0*n*tt) + b(n+1)*sin(w0*n*tt));
xx = xx + xx_n;
plot(tt,xx_n,'r'); plot(tt,xx,'m');
title(sprintf('n = %d',n+1)); pause(0.5)
end
plot(tt,xx,'k','LineWidth',3);
title('Rekonstrukcja sygnaªu ci¡gªego na podstawie szeregu Fouriera')
```