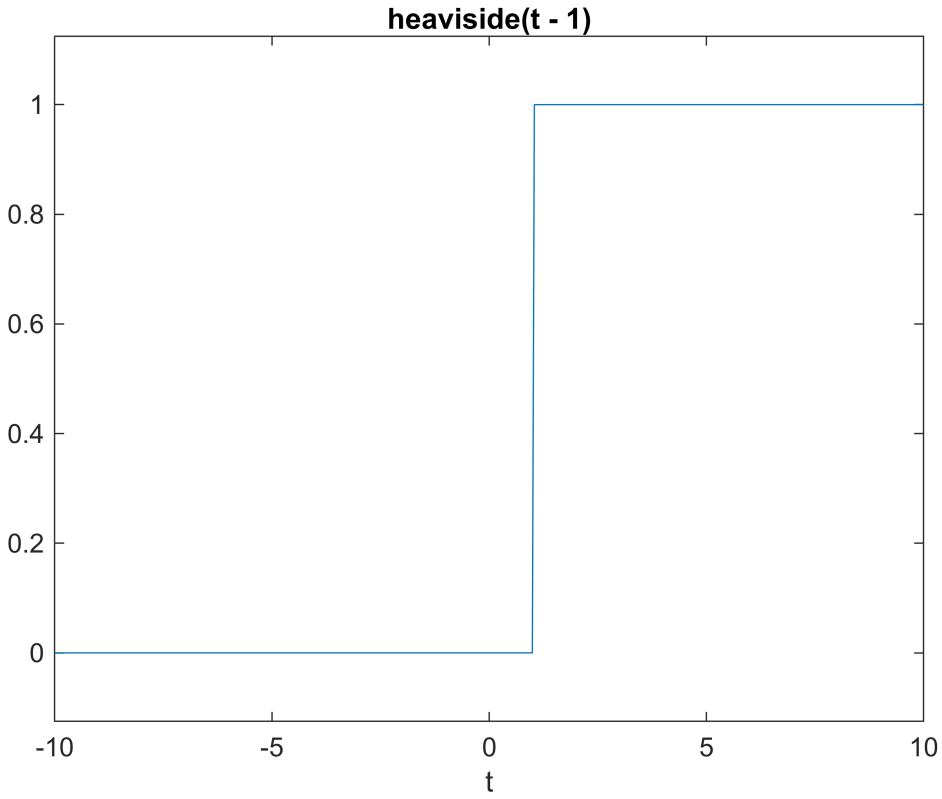
Sprawozdanie z Laboratorium 1

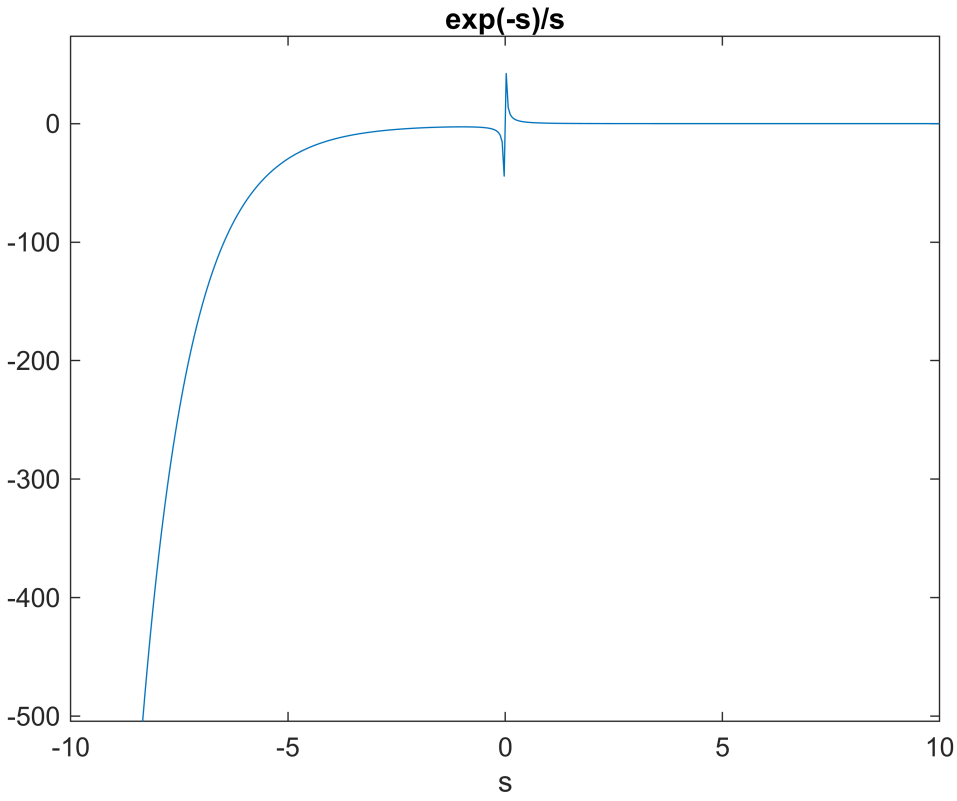
Karolina Piotrowska

Zadanie 1

```
syms t s
syms a positive
a = 1;
f = heaviside(t-a);
Fs = laplace(f,t,s);
ezplot(f, [-10,10])
```




```
ezplot(Fs, [-10,10])
```



Zadanie 2

- czy bieguny są rzeczywiste? Nie, są nierzeczywiste
- czy układ jest stabilny? Nie

```
licz = [0 0 1];
mian = [1000 500 400];
obiekt = tf(licz,mian);
[z,p,k] = tf2zp(licz, mian)
```

```
z =

  0×1 empty double column vector
p = 2×1 complex
  -0.2500 + 0.5809i
  -0.2500 - 0.5809i
k = 1.0000e-03
```

```
%z - zera układu
%p - bieguny układu
%k - wzmocnienie
oscylacyjny = (500/(2*sqrt(1000*400))) < 1
```

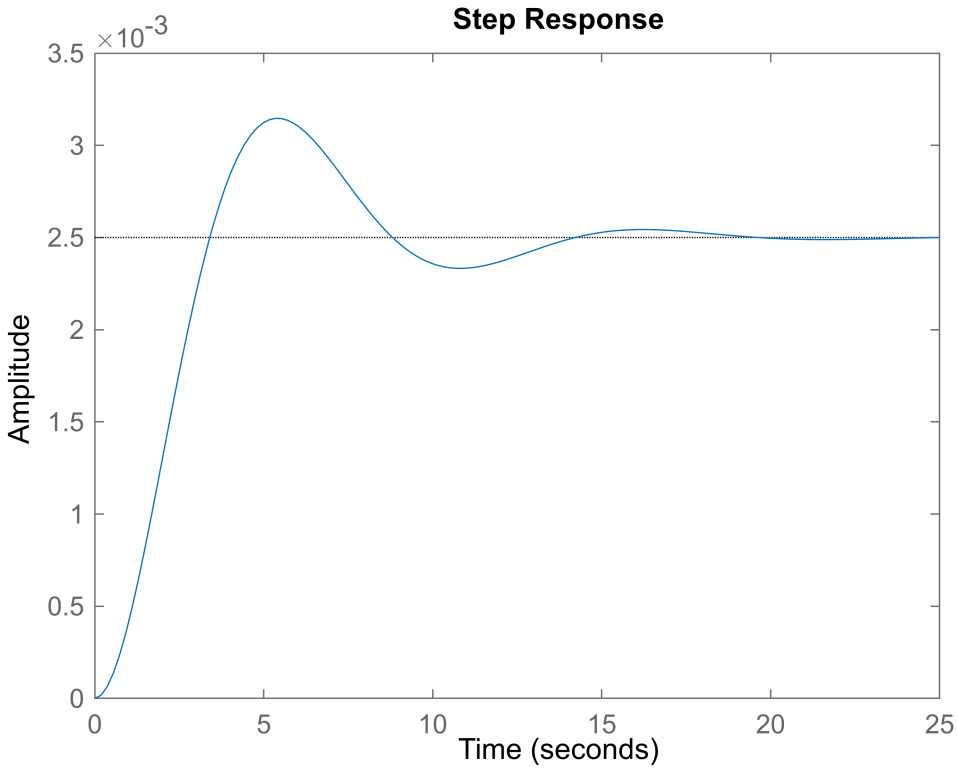
```
oscylacyjny = logical
   1
```

```
G = 1/((s - p(1))*(s - p(2))) %postać sfaktoryzowana
```

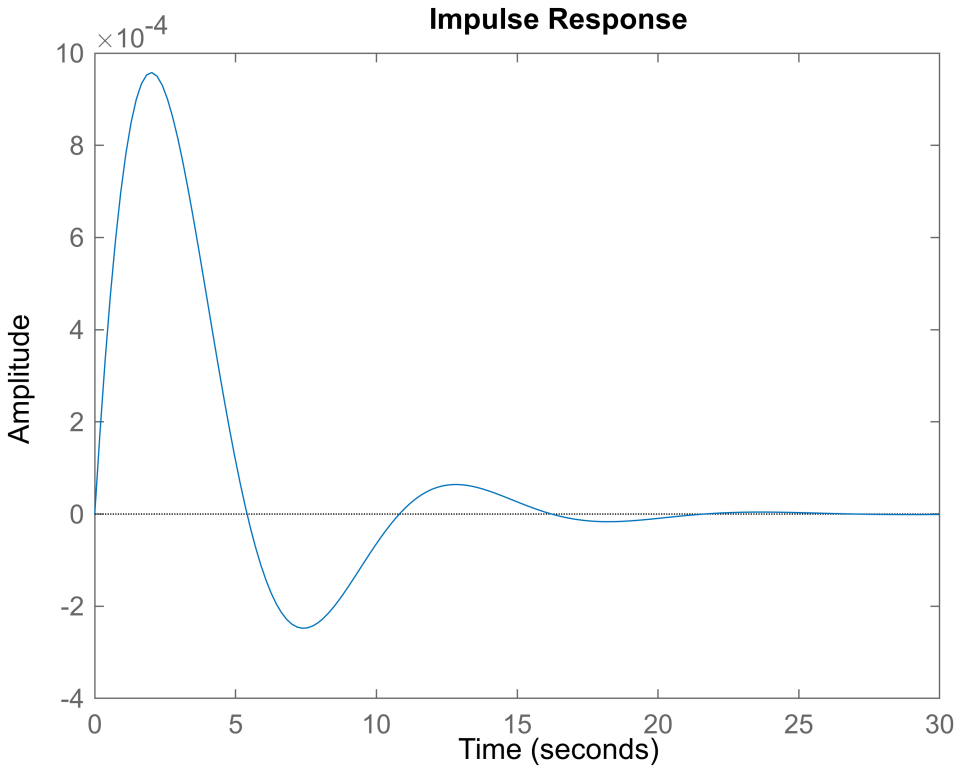
G =

$$\frac{1}{\left(s+\frac{1}{4}-\frac{3\sqrt{3}\ \sqrt{5}\ \mathrm{i}}{20}\right)\left(s+\frac{1}{4}+\frac{3\sqrt{3}\ \sqrt{5}\ \mathrm{i}}{20}\right)}$$

```
%oscylacyjny
step(licz,mian)
```



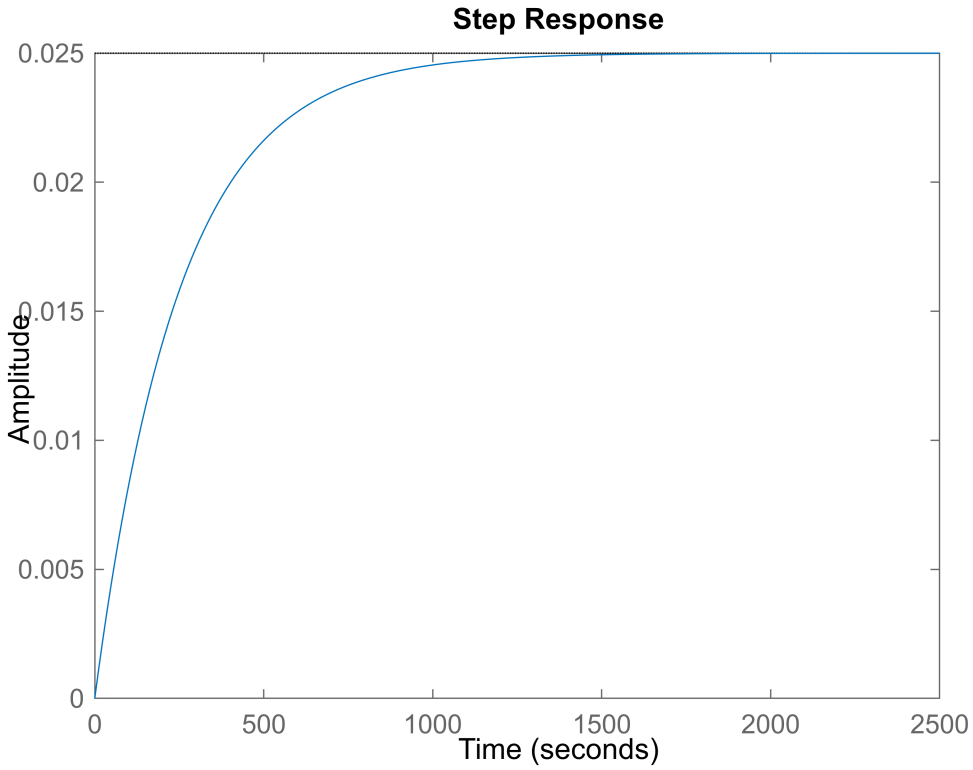

```
impulse(licz,mian)
```



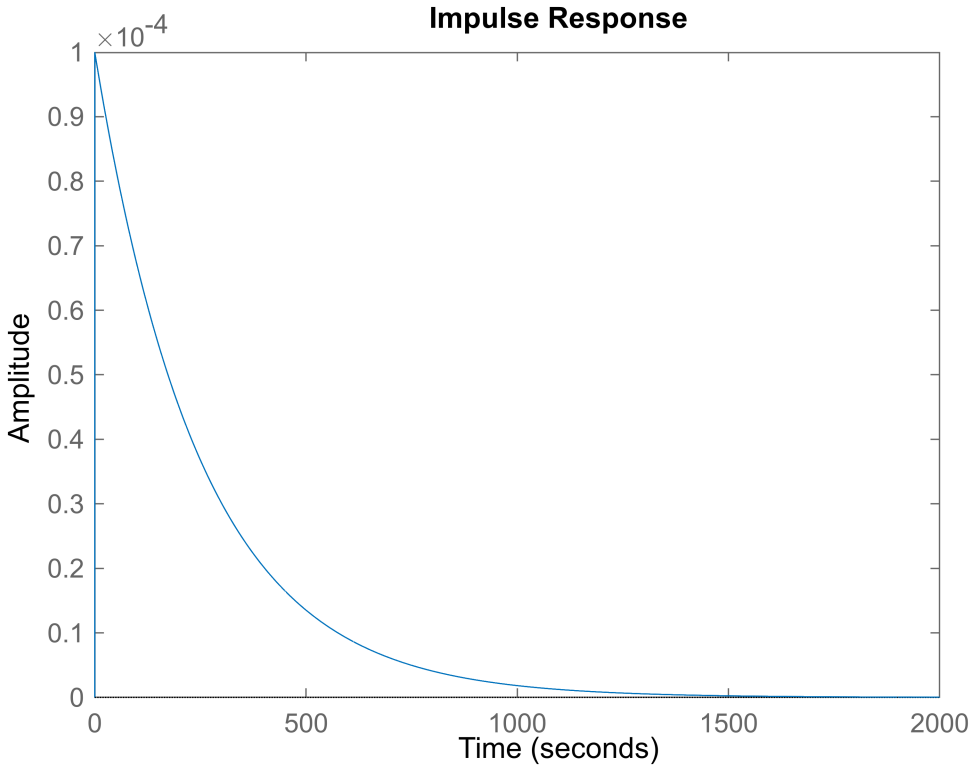

```
mian = [10 10000 40];
oscylacyjny = (10000/(2*sqrt(10*40))) < 1
```

```
oscylacyjny = logical
   0
```

```
%tłumiony
step(licz,mian)
```




```
impulse(licz,mian)
```



Zadanie 3

```
obiekt = zpk(-1/4, [0 -5 -0.1], 2)
```

```
obiekt =

    2 (s+0.25)
  ---------------
  s (s+5) (s+0.1)

Continuous-time zero/pole/gain model.
```

Zadanie 4

```
mian = [1000 500 400];
[A,B,C,D] = zp2ss(z,p,k)
```

```
A = 2×2
   -0.5000   -0.6325
    0.6325         0
B = 2×1
     1
     0
C = 1×2
         0    0.0016
D = 0
```

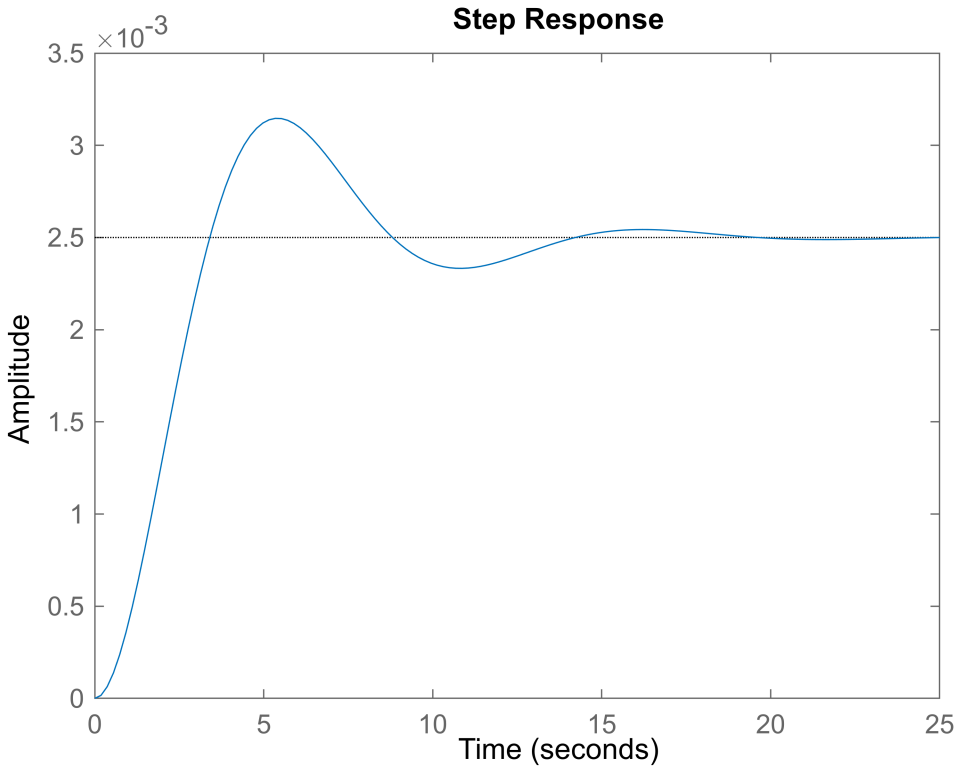
```
[A1,B1,C1,D1] = tf2ss(licz,mian)
```

```
A1 = 2×2
   -0.5000   -0.4000
    1.0000         0
B1 = 2×1
     1
     0
C1 = 1×2
10^-3 ×
         0    1.0000
D1 = 0
```

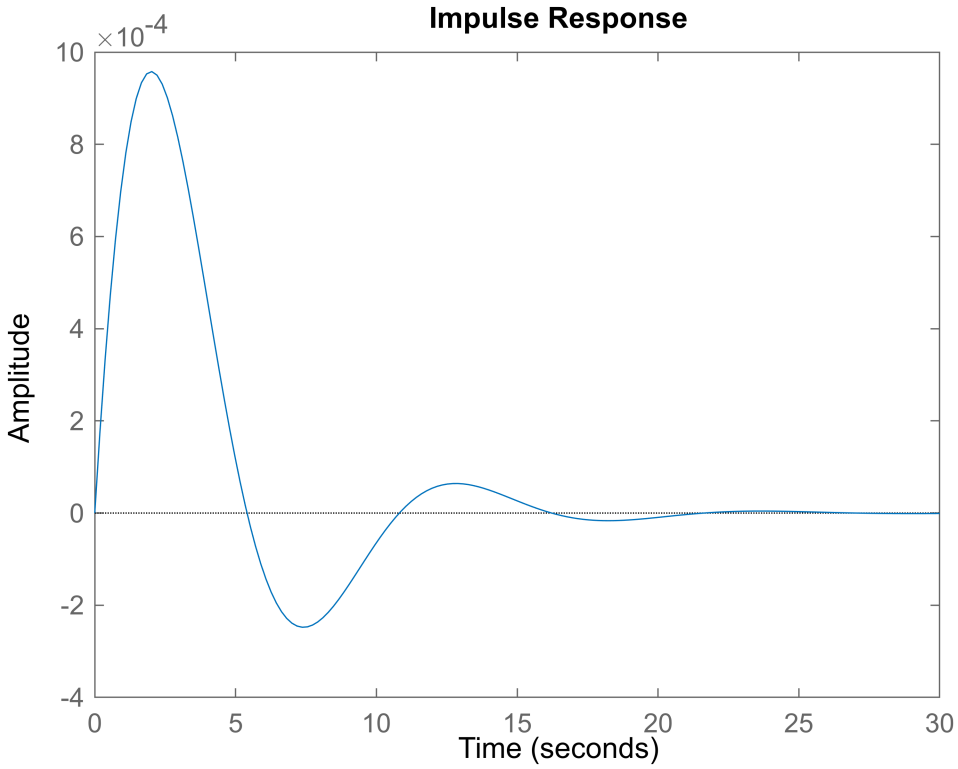
```
equal = A==A1 & B==B1 & C==C1 & D==D1
```

```
equal = 2×2 logical array
   1   0
   0   0
```

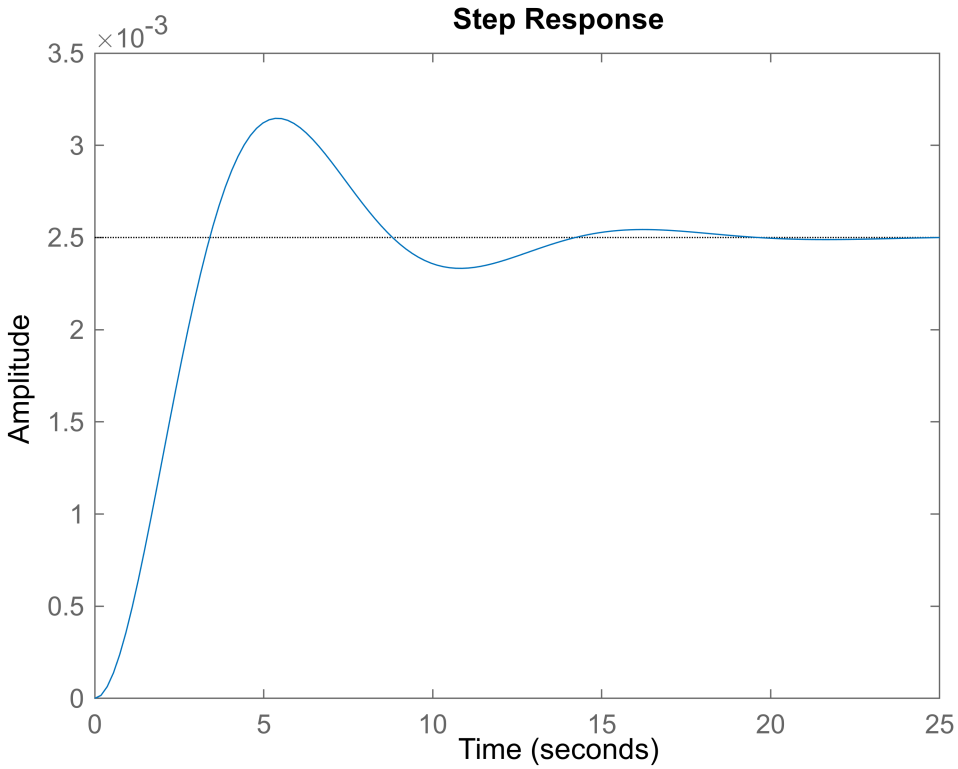
```
%macierze nie są takie same
step(A,B,C,D)
```



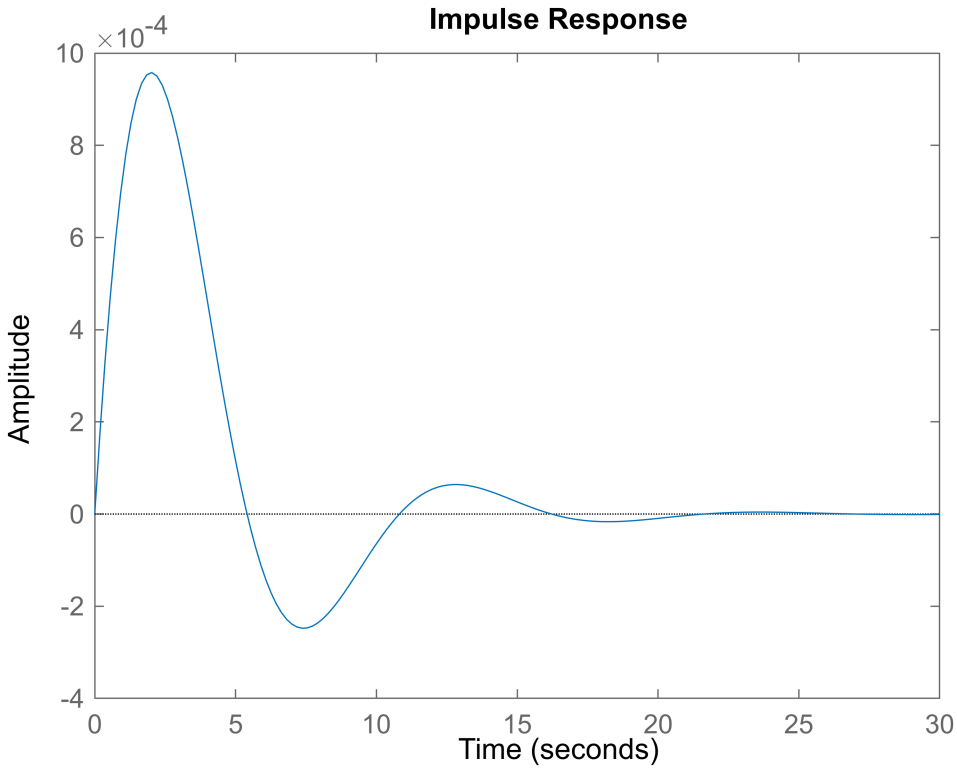

```
impulse(A,B,C,D)
```



```
step(A1,B1,C1,D1)
```




```
impulse(A1,B1,C1,D1)
```




```
%odpowiedzi są takie same
```

Zadanie 5

```
licz1 = [0 1 1];
mian1 = [1 5 1];
licz2 = [0 0 1];
mian2 = [1 1 -2 1];
sys1 = tf(licz1,mian1);
sys2 = tf(licz2,mian2);
srs = sys1 * sys2 %połączenie szeregowe
```

```
srs =

                 s + 1
  -----------------------------------
  s^5 + 6 s^4 + 4 s^3 - 8 s^2 + 3 s + 1

Continuous-time transfer function.
```

```
par = sys1 + sys2 %połączenie równoległe
```

```
par =

          s^4 + 2 s^3 + 4 s + 2
  -----------------------------------
  s^5 + 6 s^4 + 4 s^3 - 8 s^2 + 3 s + 1

Continuous-time transfer function.
```

```
fdb = feedback(sys1,sys1) %ujemne sprzężenie zwrotne
```

```
fdb =

       s^3 + 6 s^2 + 6 s + 1
  --------------------------------
  s^4 + 10 s^3 + 28 s^2 + 12 s + 2

Continuous-time transfer function.
```