

Laboratorium 12 – Transformacja falkowa

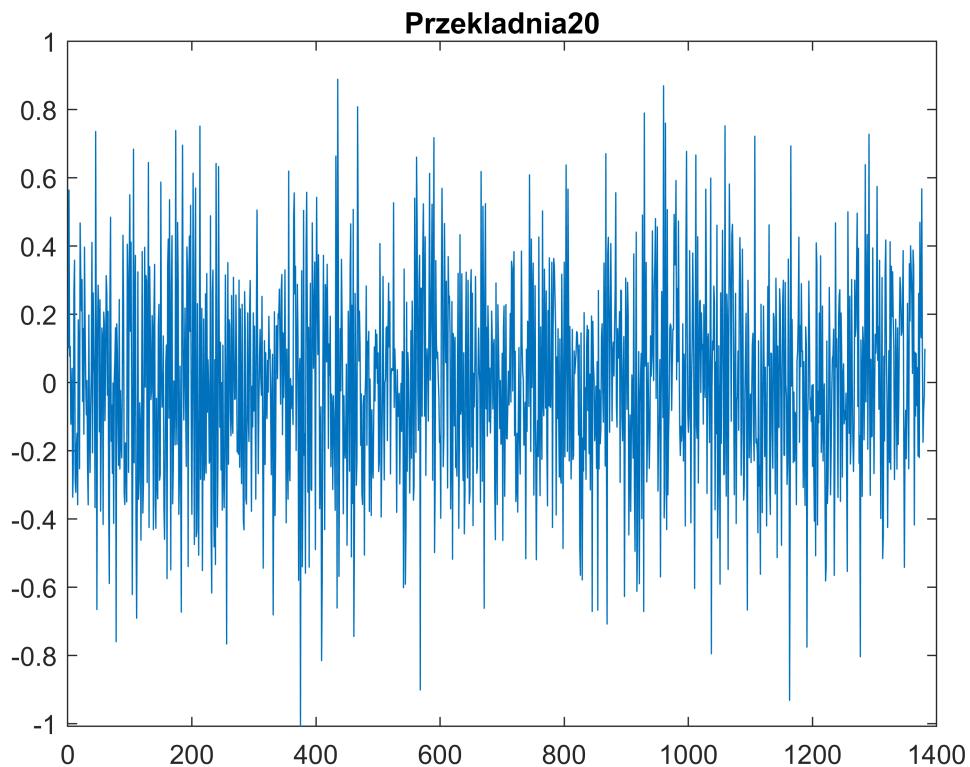
Jakub Szczypek nr 405912

grupa 5 WEAllB air

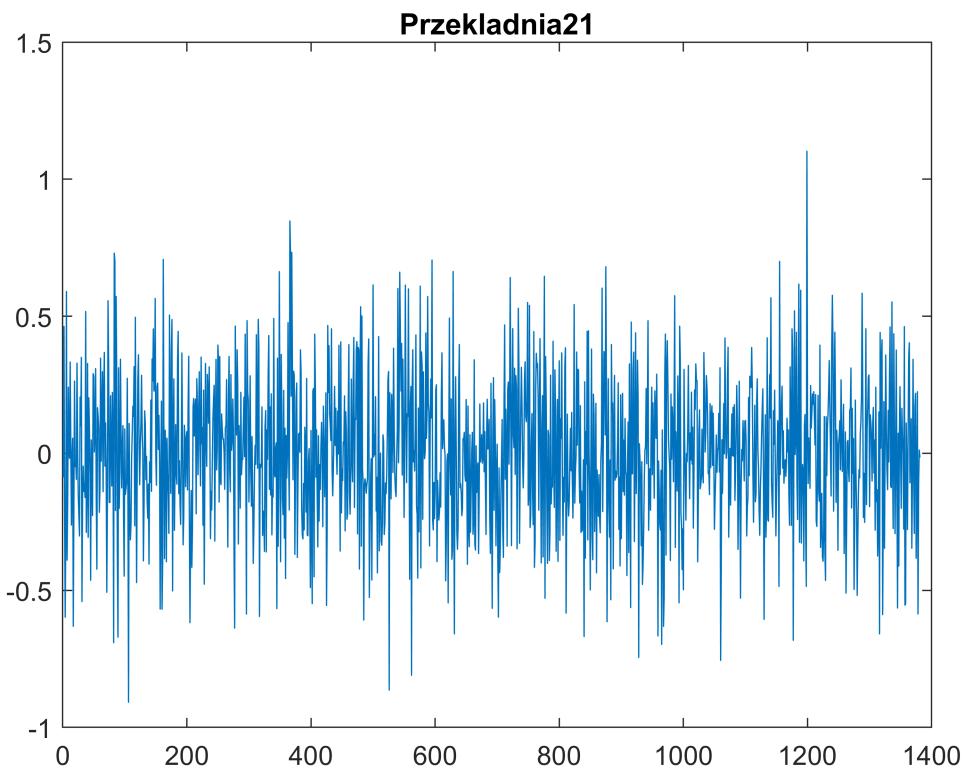
Zadanie 1

```
falka = 'db2';
num = 5;

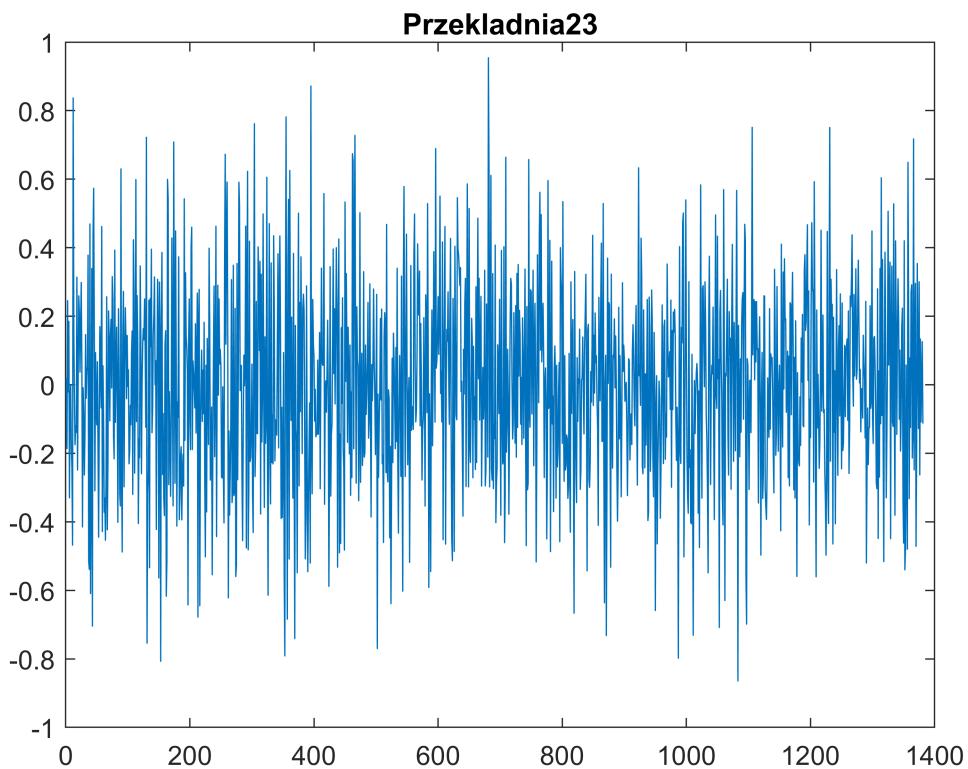
%Przekladnia20
[c, l] = wavedec(przekladnia20, num, falka);
[P20] = detcoef(c, l, num);
figure(1), plot(P20), title('Przekladnia20');
```



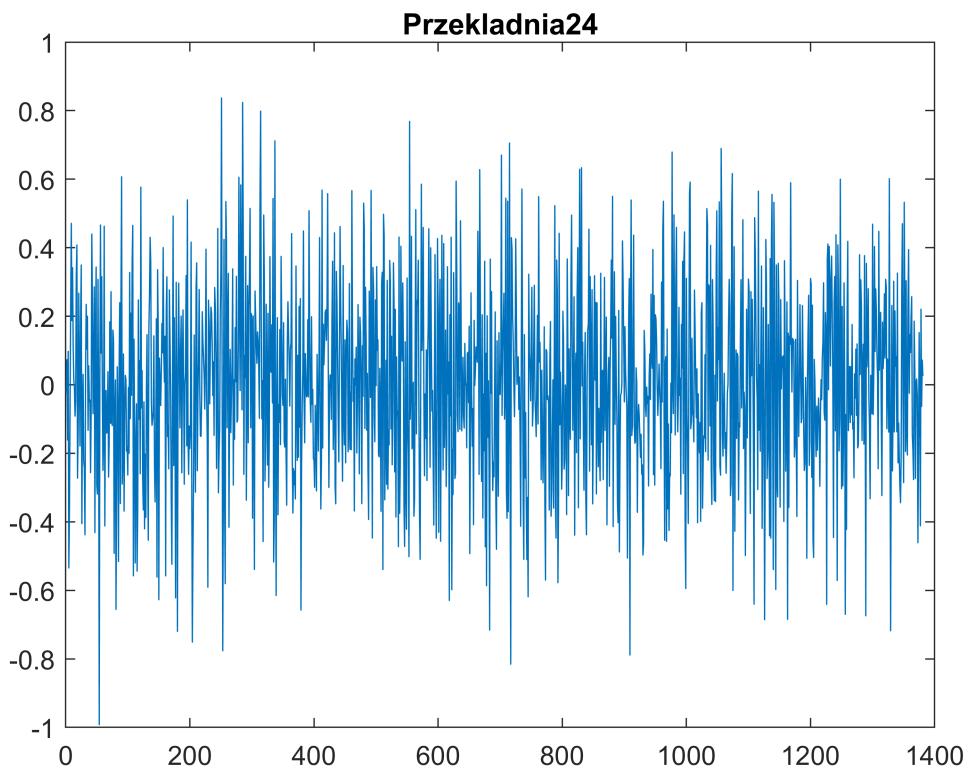
```
%Przekladnia21
[c, l] = wavedec(przekladnia21, num, falka);
[P21] = detcoef(c, l, num);
figure(2), plot(P21), title('Przekladnia21');
```



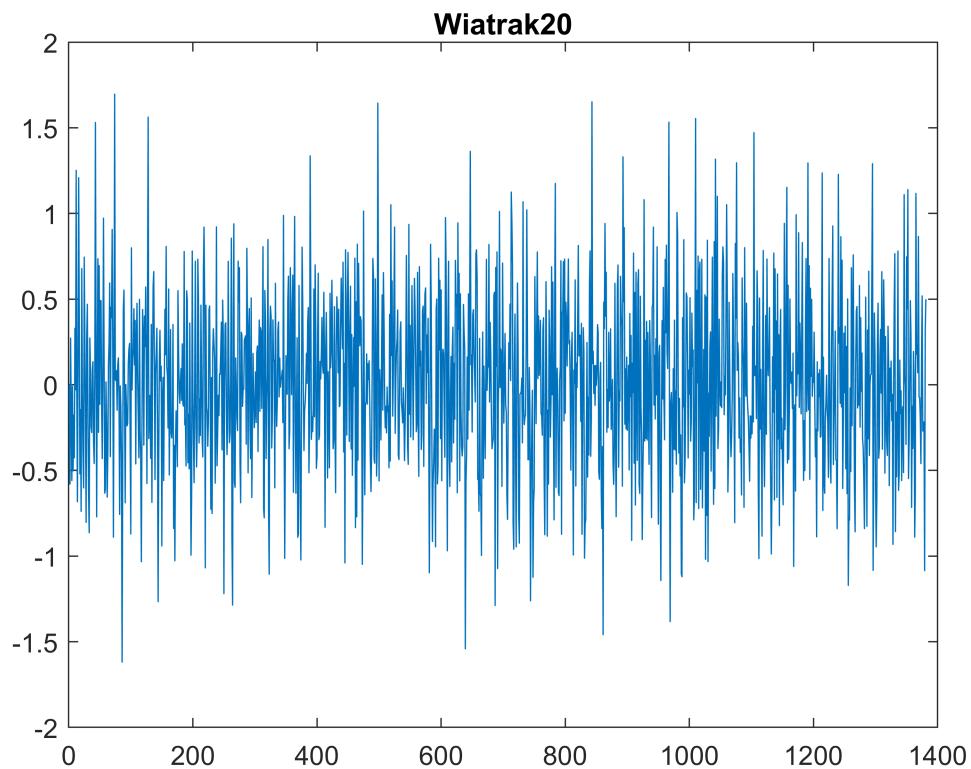
```
%Przekladnia23
[c, l] = wavedec(przekladnia23, num, falka);
[P23] = detcoef(c, l, num);
figure(3), plot(P23), title('Przekladnia23');
```



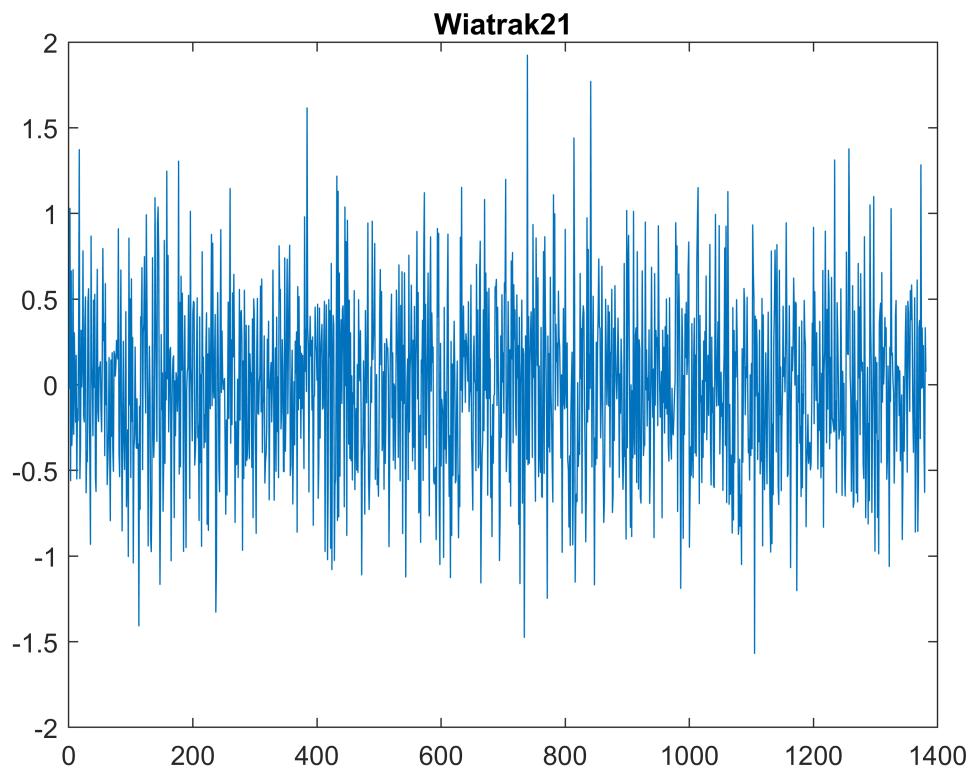
```
%Przekladnia24
[c, l] = wavedec(przekladnia24, num, falka);
[P24] = detcoef(c, l, num);
figure(4), plot(P24), title('Przekladnia24');
```



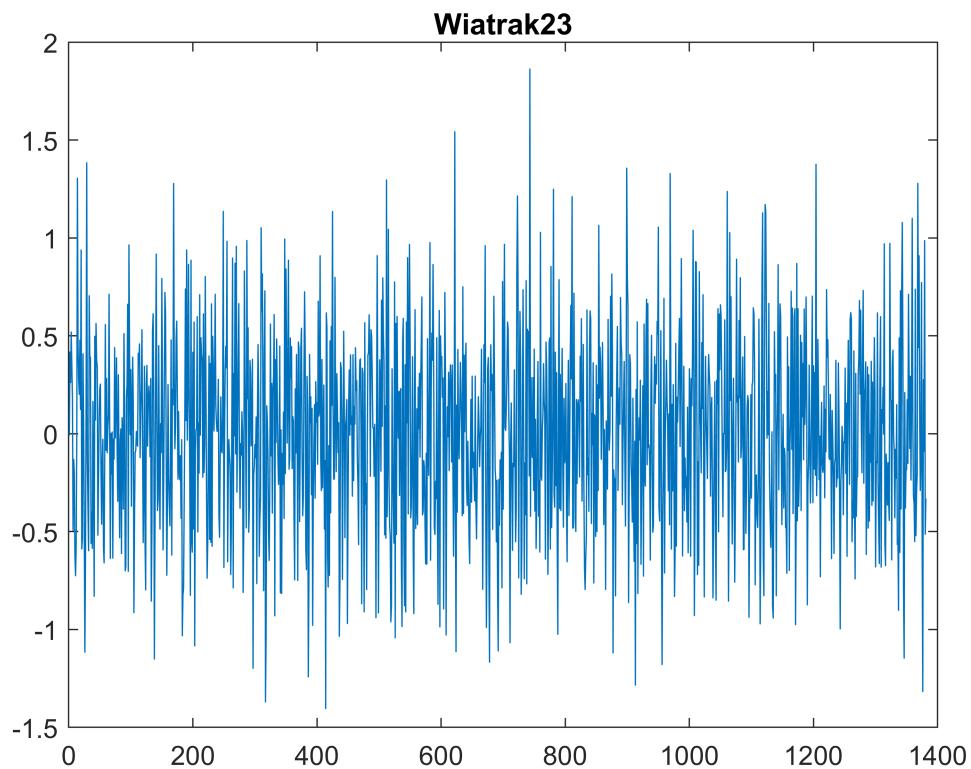
```
%Wiatrak20
[c, l] = wavedec(wiatrak20, num, falka);
[W20] = detcoef(c, l, num);
figure(5), plot(W20), title('Wiatrak20');
```



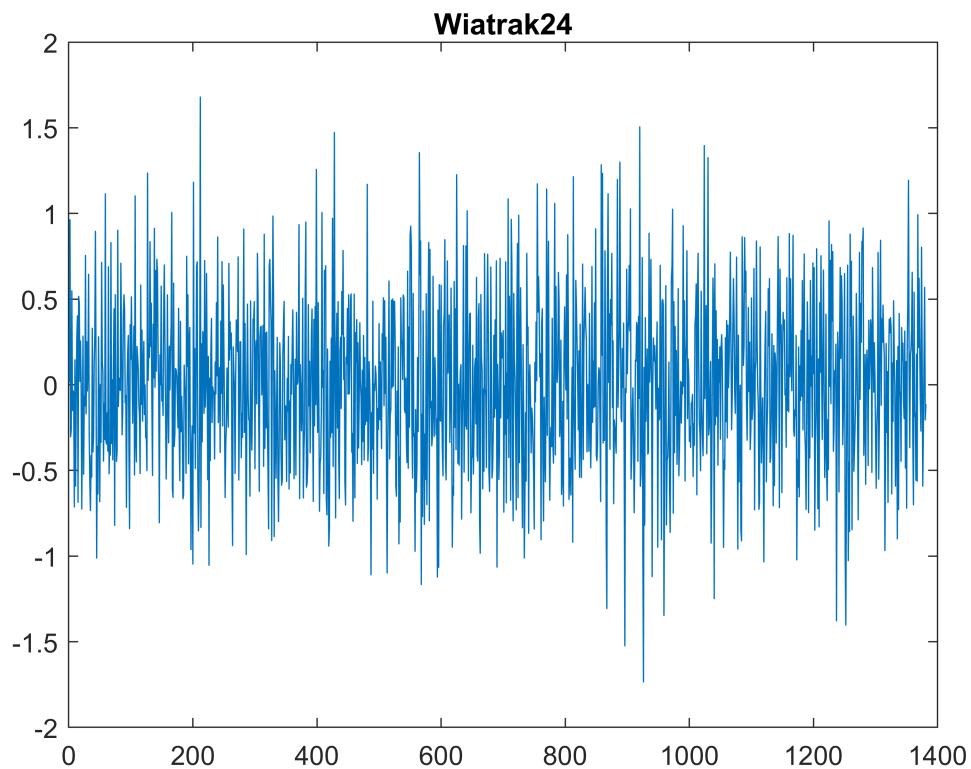
```
%Wiatrak21
[c, l] = wavedec(wiatrak21, num, falka);
[W21] = detcoef(c, l, num);
figure(6), plot(W21), title('Wiatrak21');
```



```
%Wiatrak23
[c, l] = wavedec(wiatrak23, num, falka);
[W23] = detcoef(c, l, num);
figure(7), plot(W23), title('Wiatrak23');
```



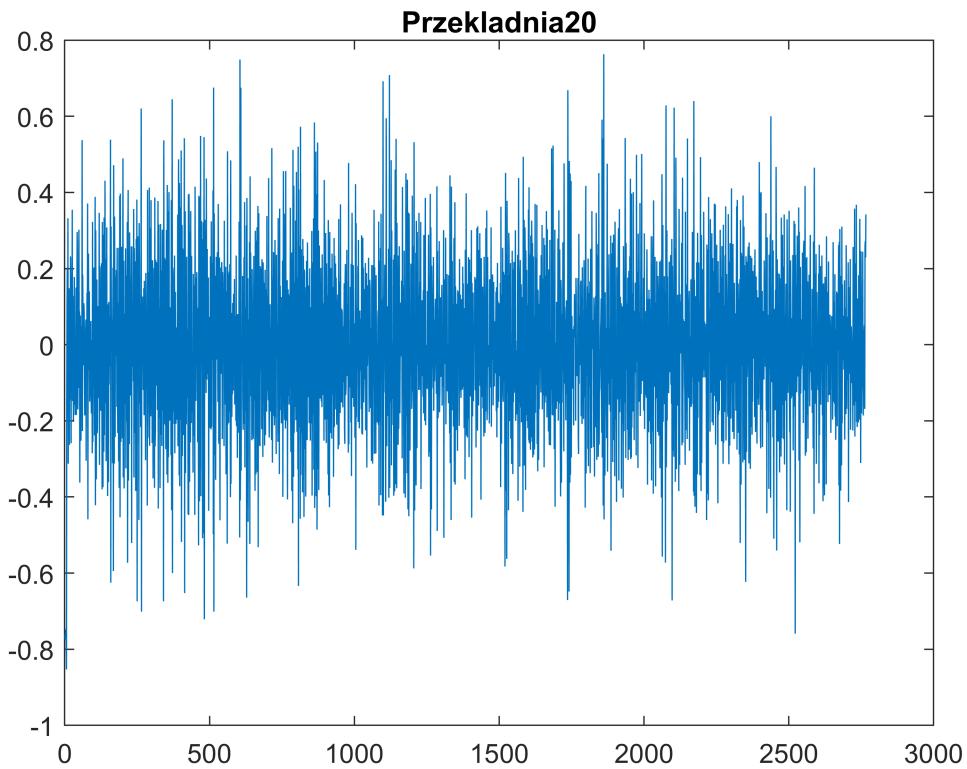
```
%Wiatrak24
[c, l] = wavedec(wiatrak24, num, falka);
[W24] = detcoef(c, l, num);
figure(8), plot(W24), title('Wiatrak24');
```



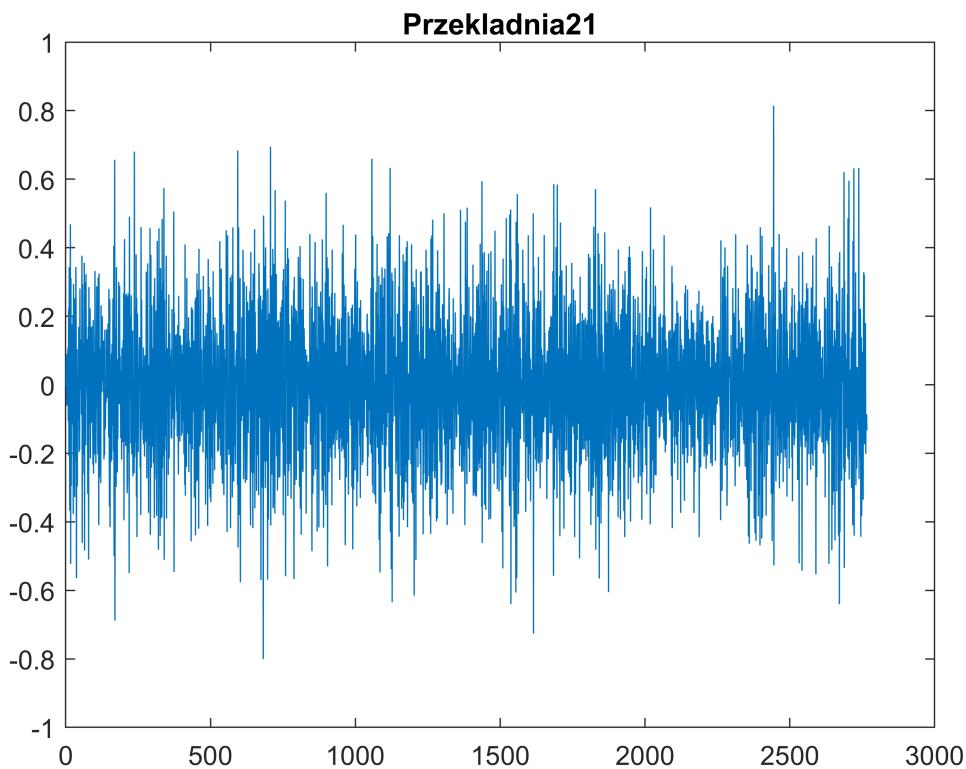
Zadanie 2

```
falka = 'coif2';
num = 4;

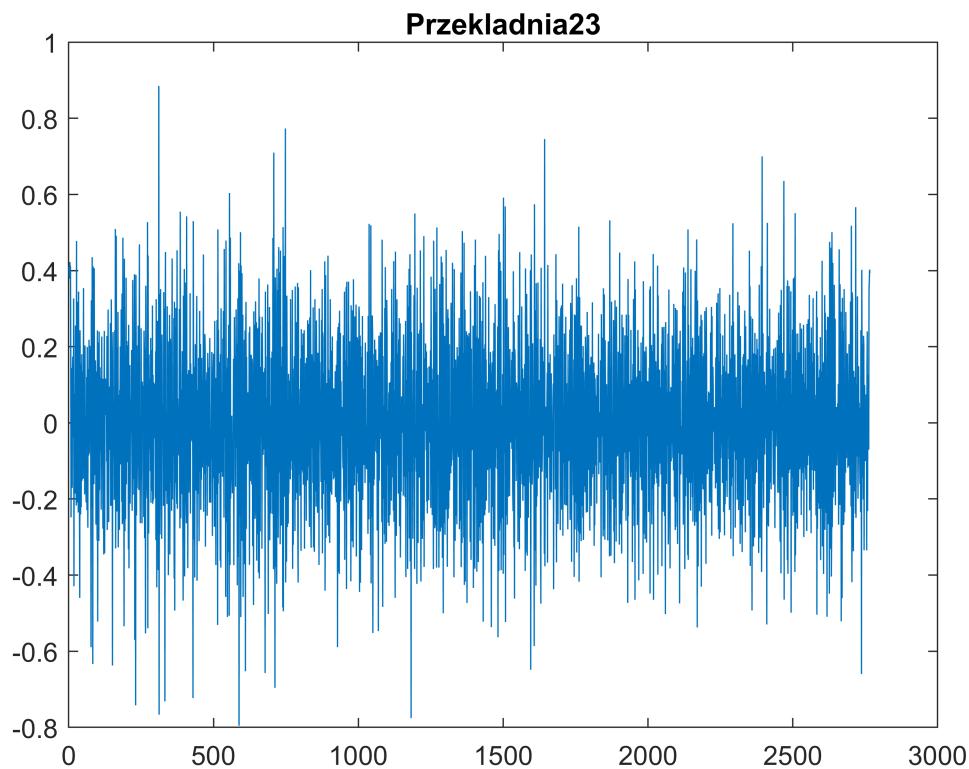
%Przekladnia20
[c, l] = wavedec(przekladnia20, num, falka);
[P20] = appcoef(c, l, falka, num);
figure(9), plot(P20), title('Przekladnia20');
```



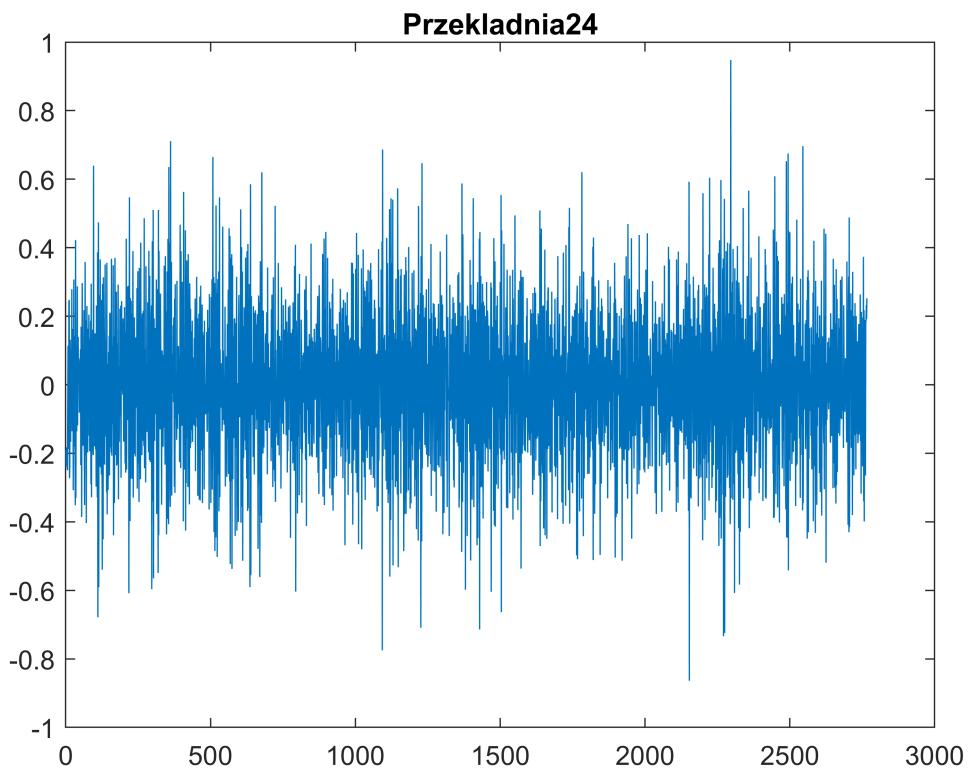
```
%Przekladnia21
[c, l] = wavedec(przekladnia21, num, falka);
[P21] = appcoef(c, l, falka, num);
figure(10), plot(P21), title('Przekladnia21');
```



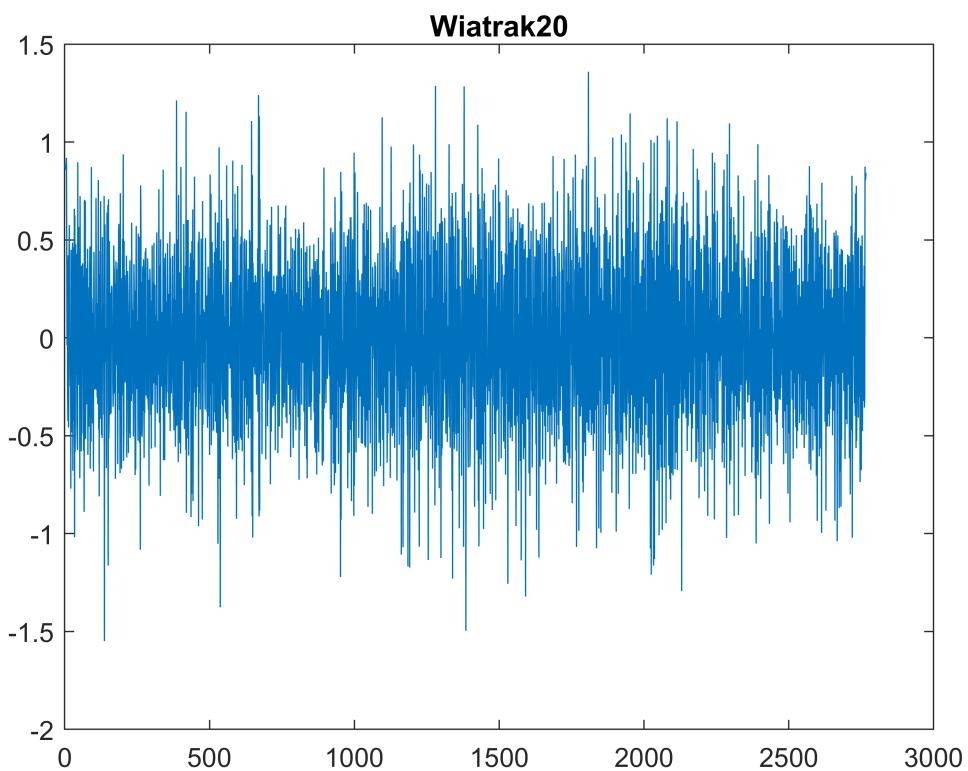
```
%Przekladnia23
[c, l] = wavedec(przekladnia23, num, falka);
[P23] = appcoef(c, l, falka, num);
figure(11), plot(P23), title('Przekladnia23');
```



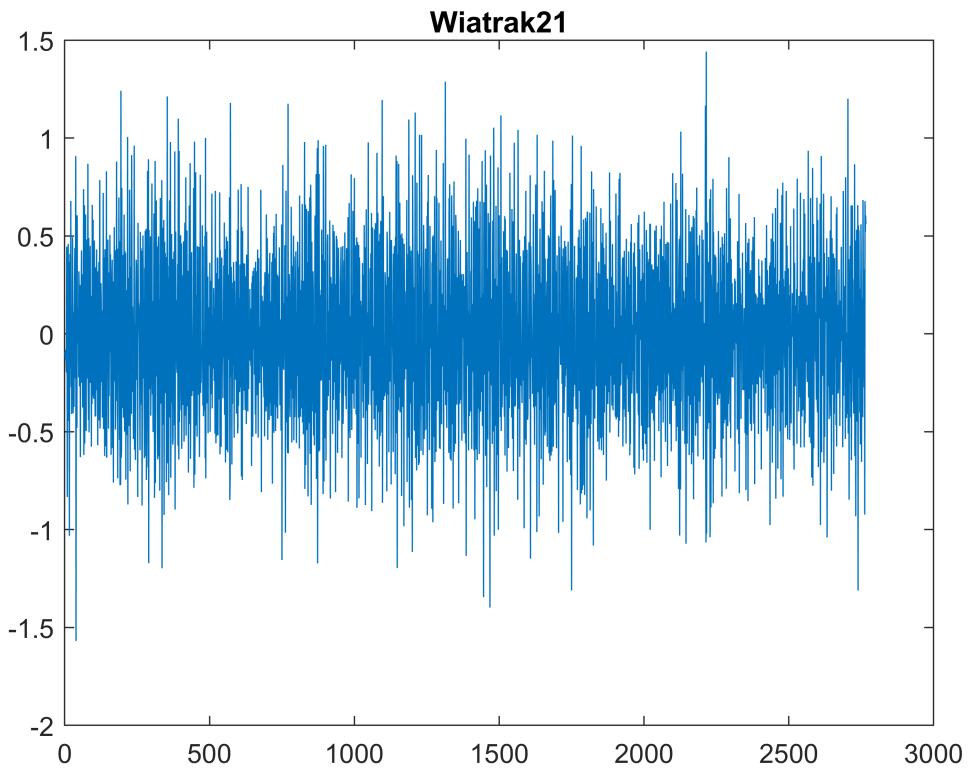
```
%Przekladnia24
[c, l] = wavedec(przekladnia24, num, falka);
[P24] = appcoef(c, l, falka, num);
figure(12), plot(P24), title('Przekladnia24');
```



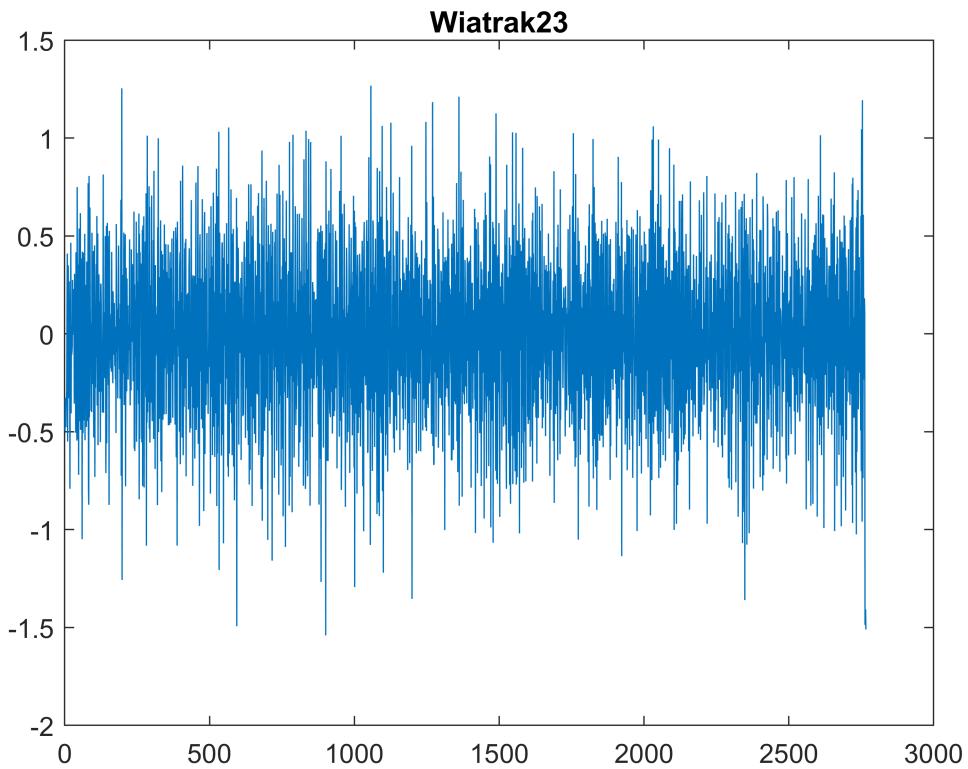
```
%Wiatrak20
[c, l] = wavedec(wiatrak20, num, falka);
[W20] = appcoef(c, l, falka, num);
figure(13), plot(W20), title('Wiatrak20');
```



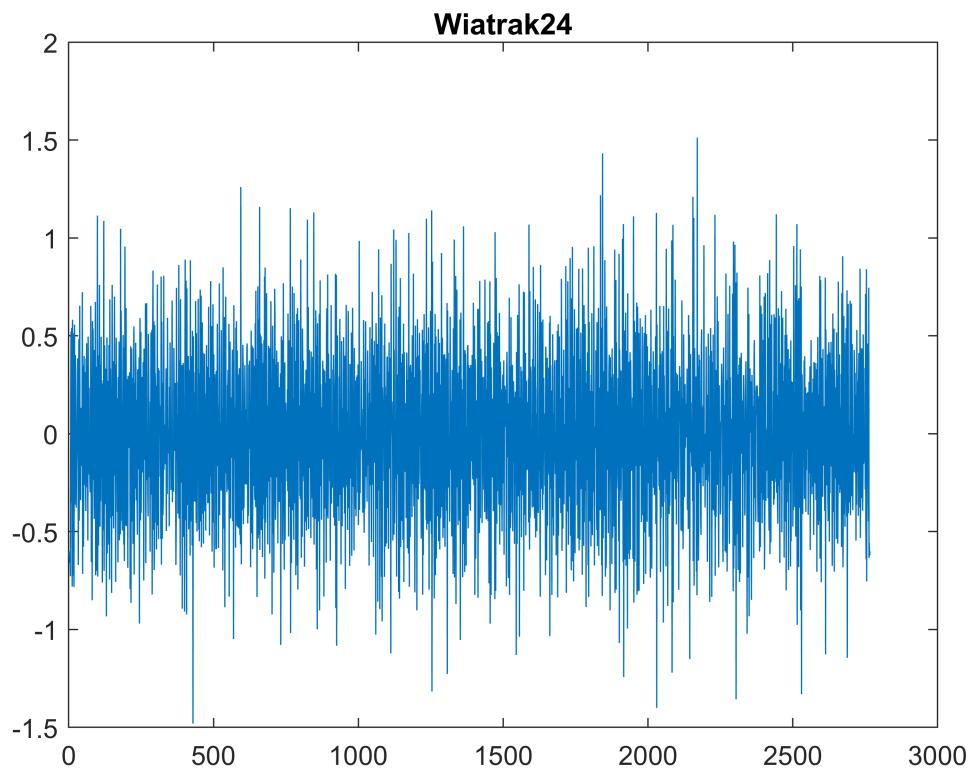
```
%Wiatrak21
[c, l] = wavedec(wiatrak21, num, falka);
[W21] = appcoef(c, l, falka, num);
figure(14), plot(W21), title('Wiatrak21');
```



```
%Wiatrak23
[c, l] = wavedec(wiatrak23, num, falka);
[W23] = appcoef(c, l, falka, num);
figure(15), plot(W23), title('Wiatrak23');
```



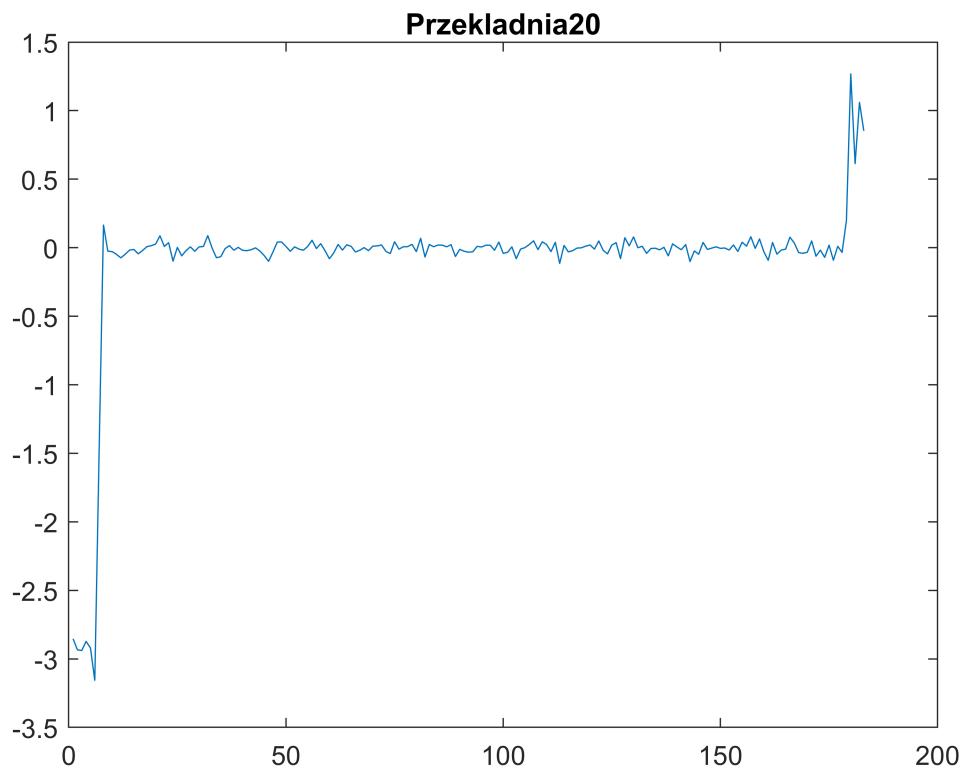
```
%Wiatrak24
[c, l] = wavedec(wiatrak24, num, falka);
[W24] = appcoef(c, l, falka, num);
figure(16), plot(W24), title('Wiatrak24');
```



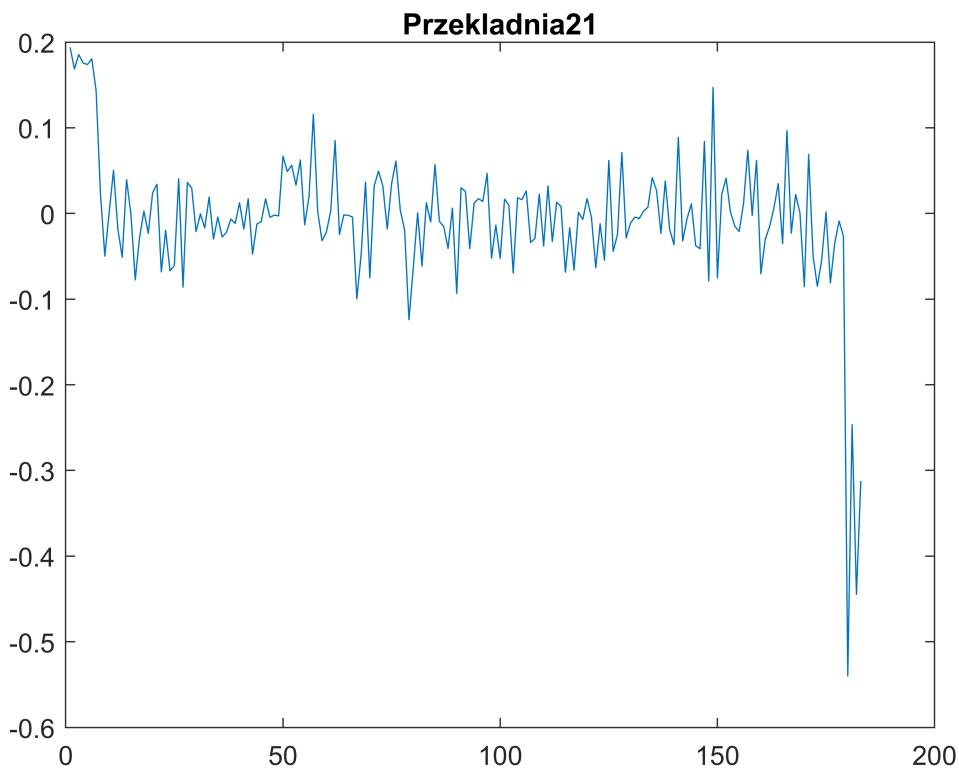
Zadanie 3

```
falka = 'coif2';
num = 8;

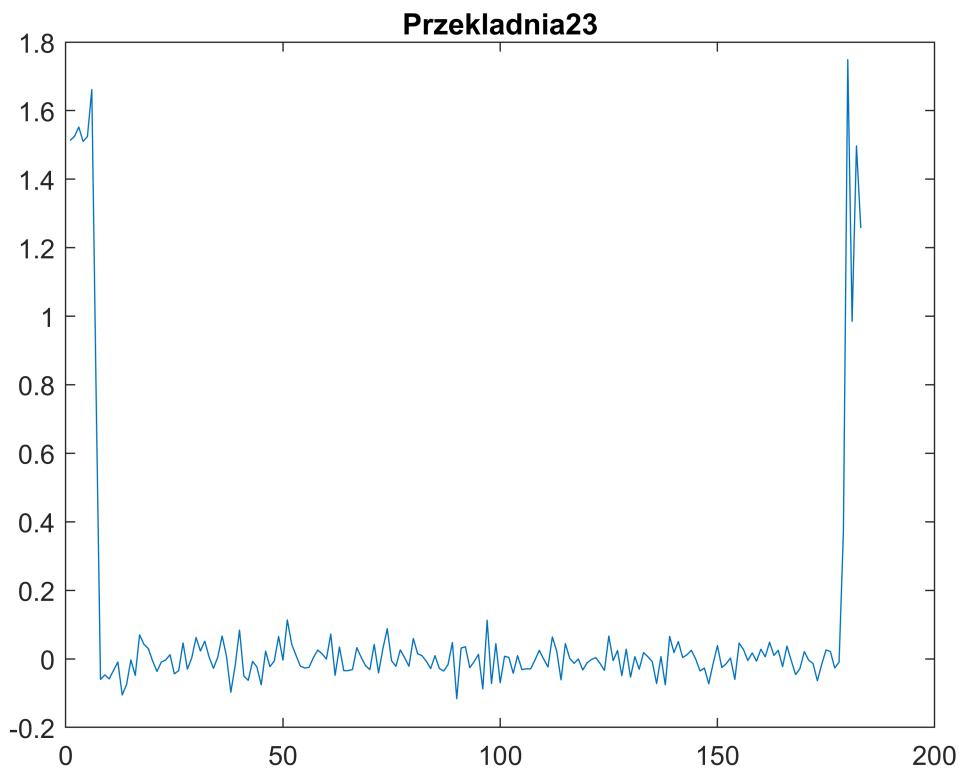
%Przekladnia20
[c, l] = wavedec(przekladnia20, num, falka);
[P20] = appcoef(c, l, falka, num);
figure(17), plot(P20), title('Przekladnia20');
```



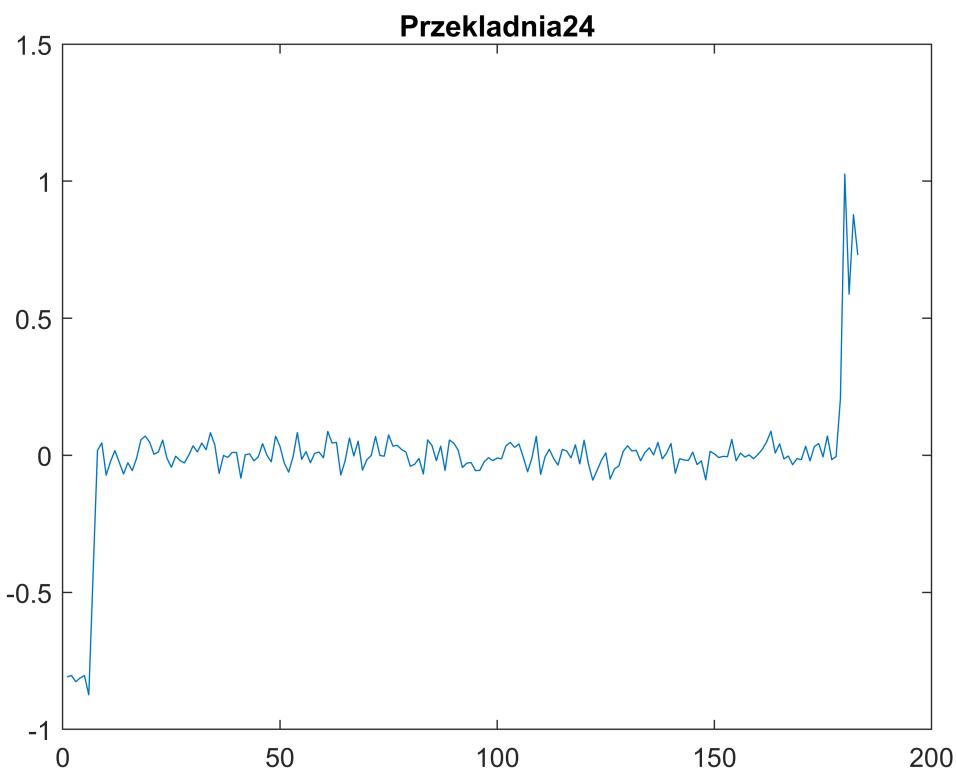
```
%Przekladnia21
[c, l] = wavedec(przekladnia21, num, falka);
[P21] = appcoef(c, l, falka, num);
figure(18), plot(P21), title('Przekladnia21');
```



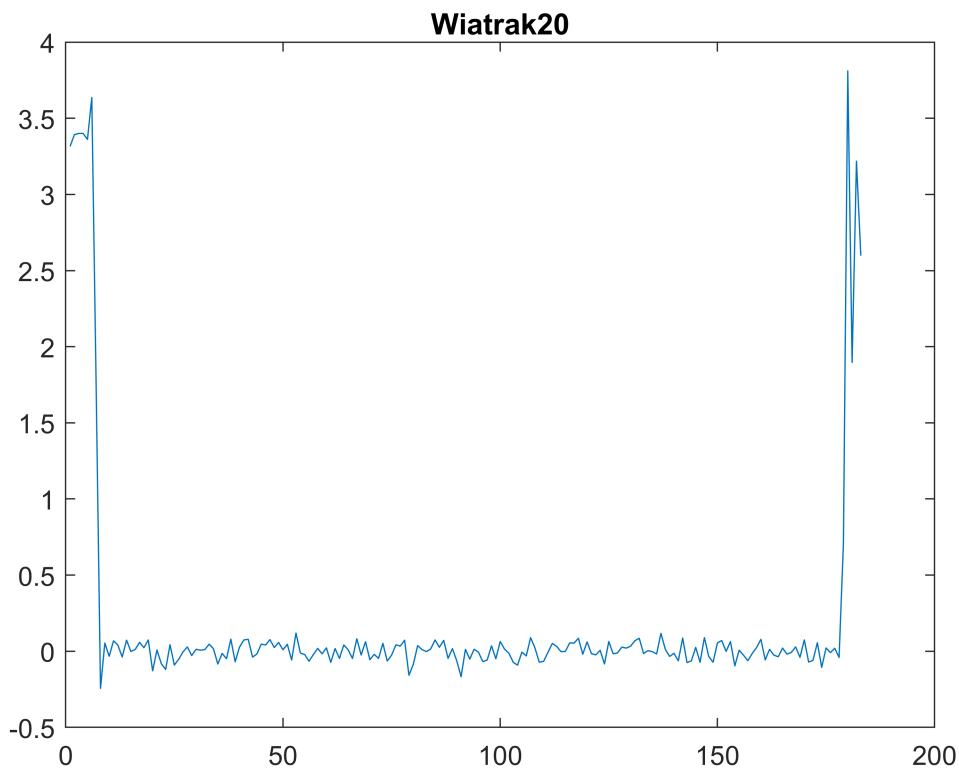
```
%Przekladnia23
[c, l] = wavedec(przekladnia23, num, falka);
[P23] = appcoef(c, l, falka, num);
figure(19), plot(P23), title('Przekladnia23');
```



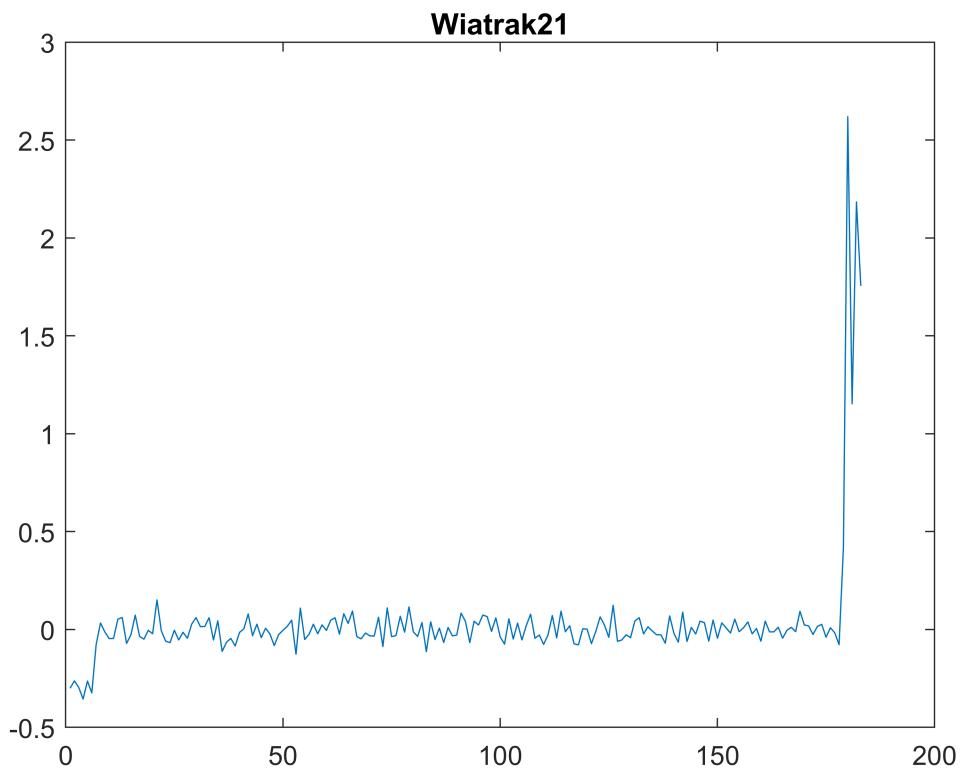
```
%Przekladnia24
[c, l] = wavedec(przekladnia24, num, falka);
[P24] = appcoef(c, l, falka, num);
figure(20), plot(P24), title('Przekladnia24');
```



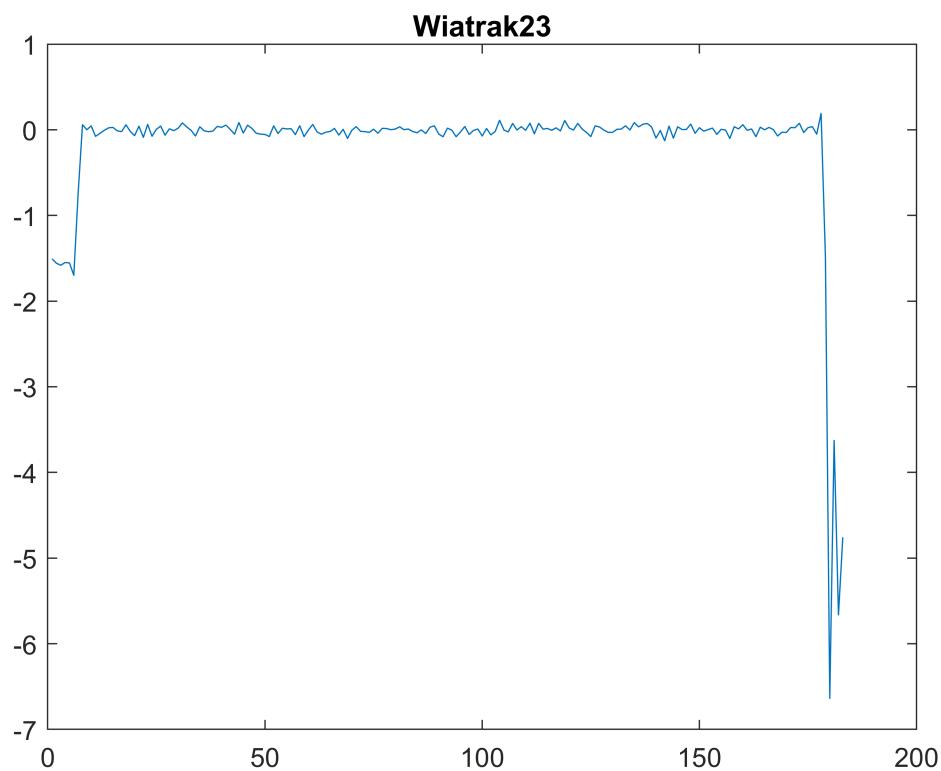
```
%Wiatrak20
[c, l] = wavedec(wiatrak20, num, falka);
[W20] = appcoef(c, l, falka, num);
figure(21), plot(W20), title('Wiatrak20');
```



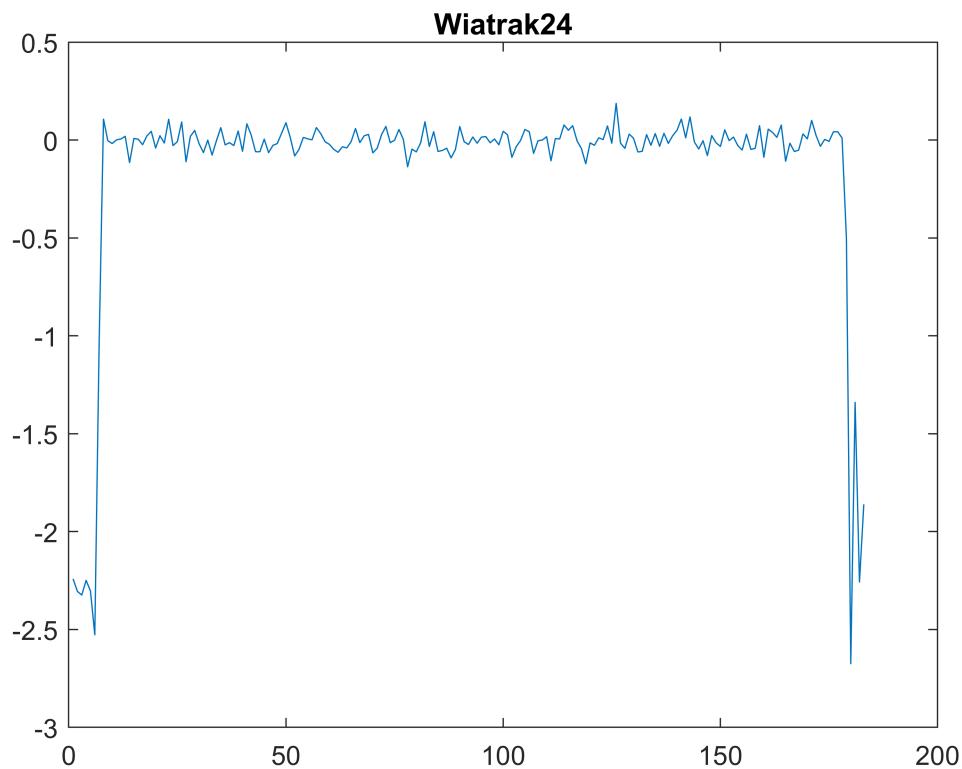
```
%Wiatrak21
[c, l] = wavedec(wiatrak21, num, falka);
[W21] = appcoef(c, l, falka, num);
figure(22), plot(W21), title('Wiatrak21');
```



```
%Wiatrak23
[c, l] = wavedec(wiatrak23, num, falka);
[W23] = appcoef(c, l, falka, num);
figure(23), plot(W23), title('Wiatrak23');
```



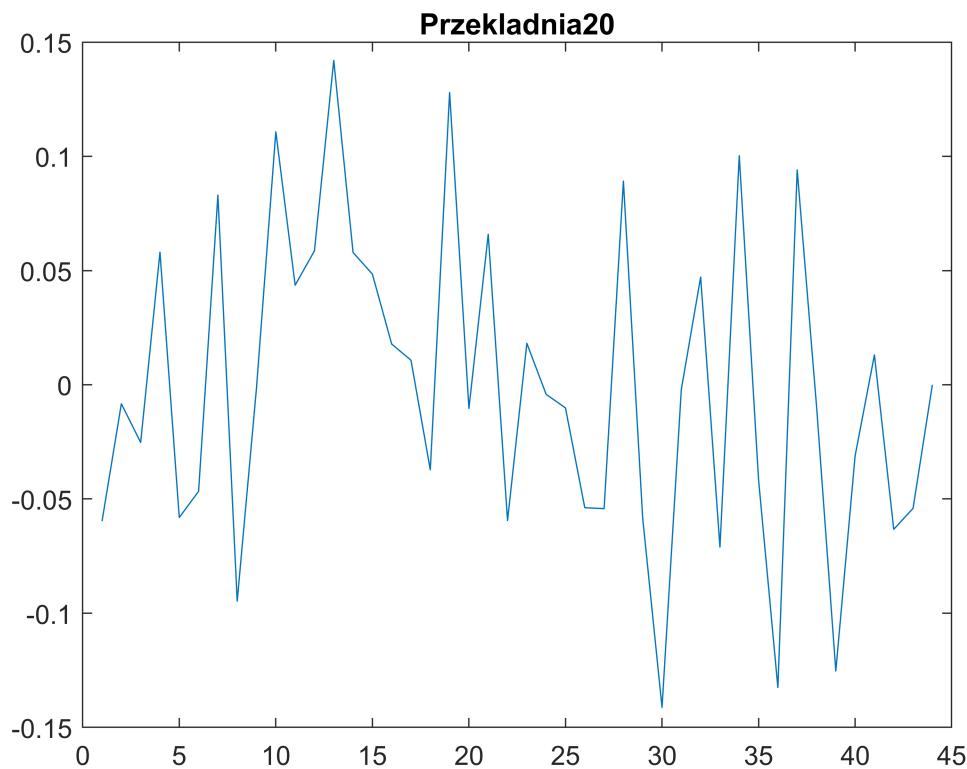
```
%Wiatrak24
[c, l] = wavedec(wiatrak24, num, falka);
[W24] = appcoef(c, l, falka, num);
figure(24), plot(W24), title('Wiatrak24');
```



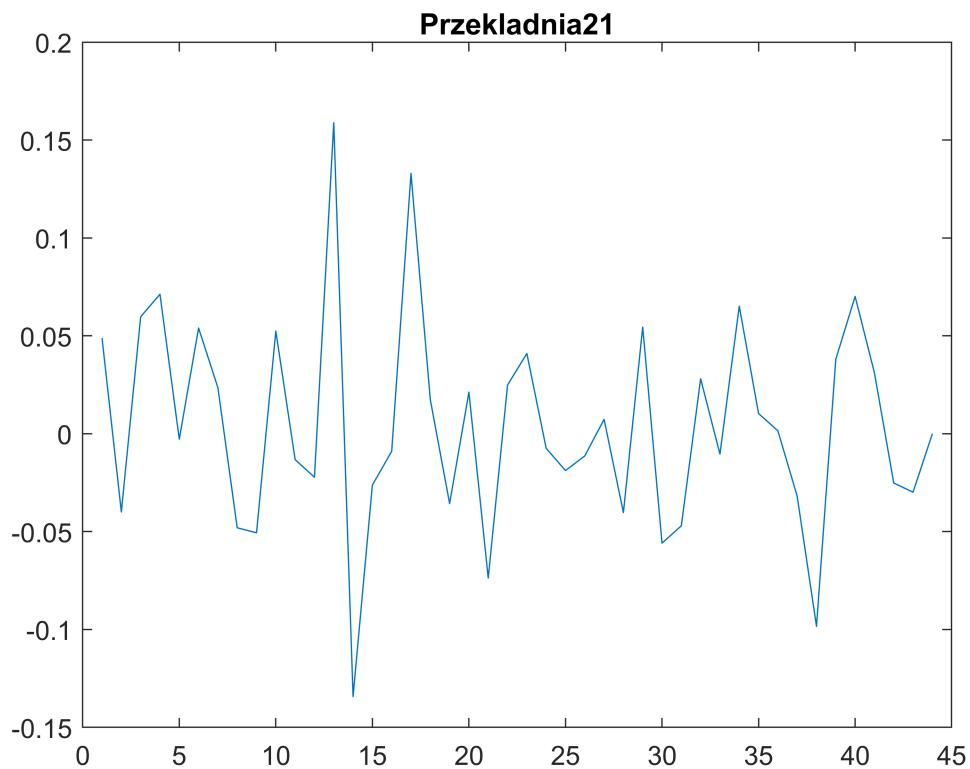
Zadanie 4

```
falka = 'haar';
num = 10;

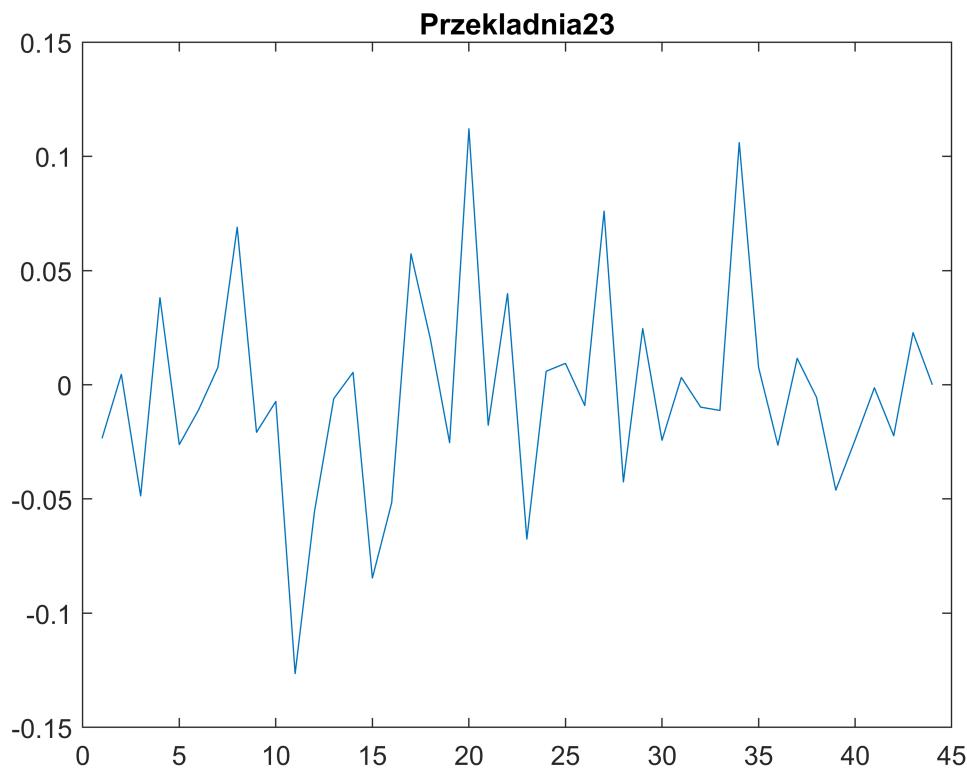
%Przekladnia20
[c, l] = wavedec(przekladnia20, num, falka);
[P20] = detcoef(c, l, num);
figure(25), plot(P20), title('Przekladnia20');
```



```
%Przekladnia21
[c, l] = wavedec(przekladnia21, num, falka);
[P21] = detcoef(c, l, num);
figure(26), plot(P21), title('Przekladnia21');
```

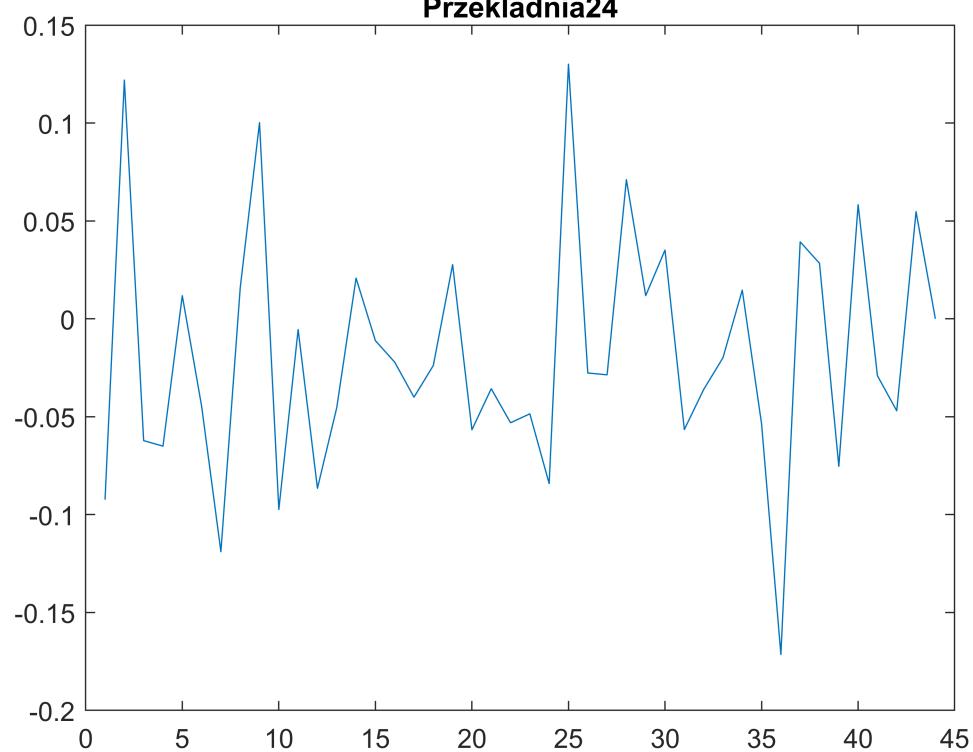


```
%Przekladnia23
[c, l] = wavedec(przekladnia23, num, falka);
[P23] = detcoef(c, l, num);
figure(27), plot(P23), title('Przekladnia23');
```



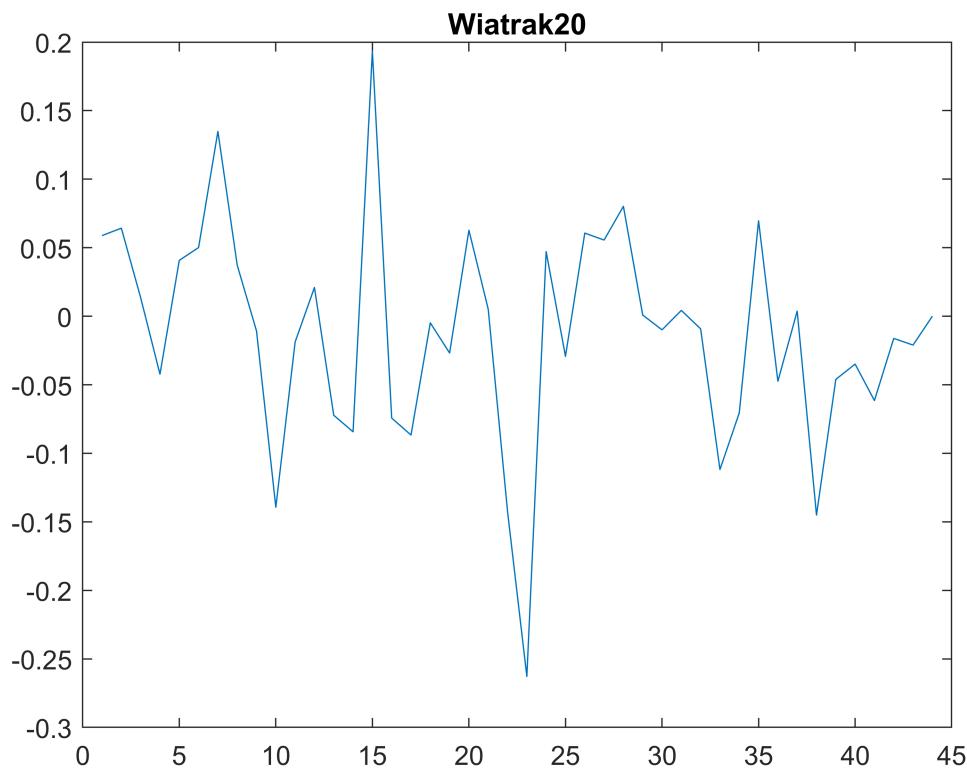
```
%Przekladnia24
[c, l] = wavedec(przekladnia24, num, falka);
[P24] = detcoef(c, l, num);
figure(28), plot(P24), title('Przekladnia24');
```

Przekladnia24

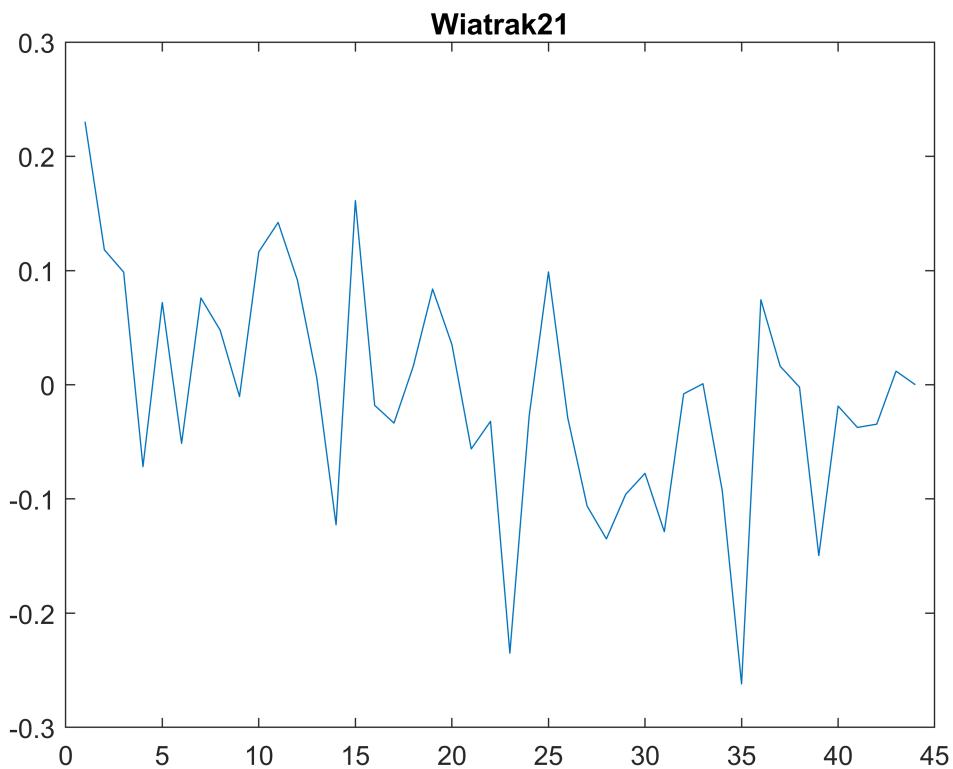


```
%Wiatrak20
```

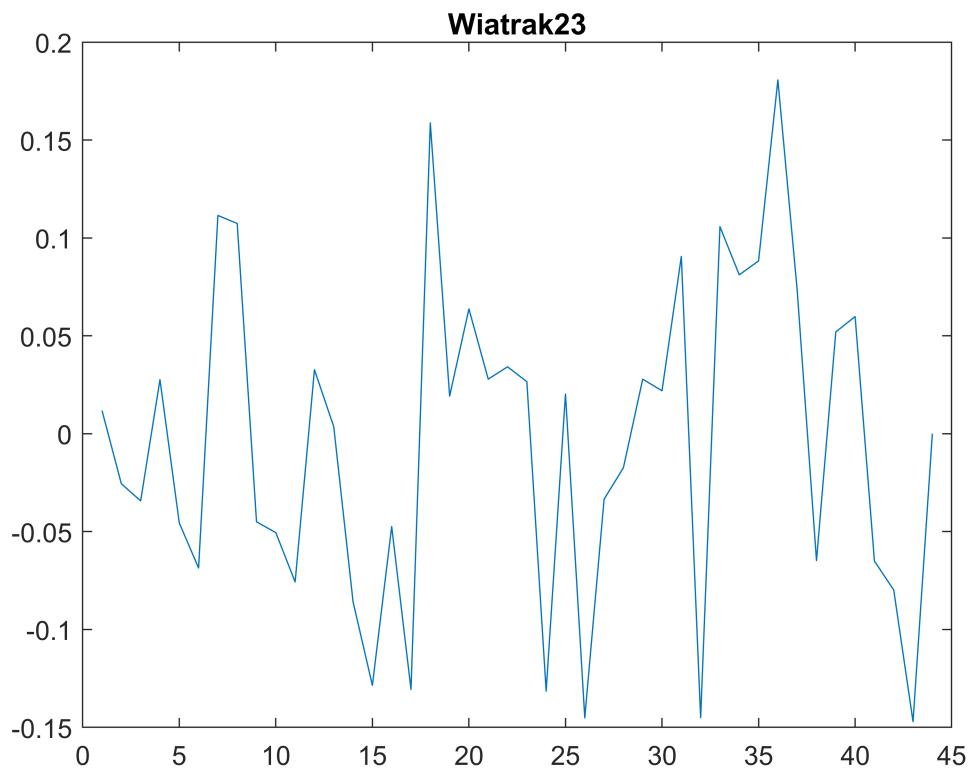
```
[c, l] = wavedec(wiatrak20, num, falka);
[W20] = detcoef(c, l, num);
figure(29), plot(W20), title('Wiatrak20');
```



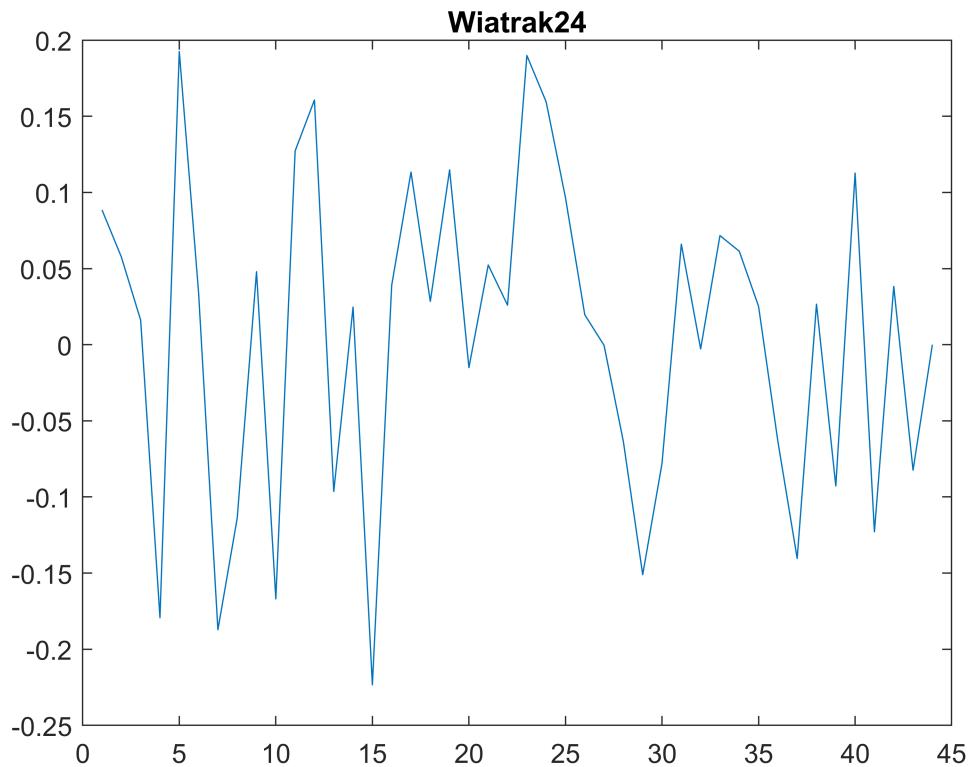
```
%Wiatrak21
[c, l] = wavedec(wiatrak21, num, falka);
[W21] = detcoef(c, l, num);
figure(30), plot(W21), title('Wiatrak21');
```



```
%Wiatrak23
[c, l] = wavedec(wiatrak23, num, falka);
[W23] = detcoef(c, l, num);
figure(31), plot(W23), title('Wiatrak23');
```



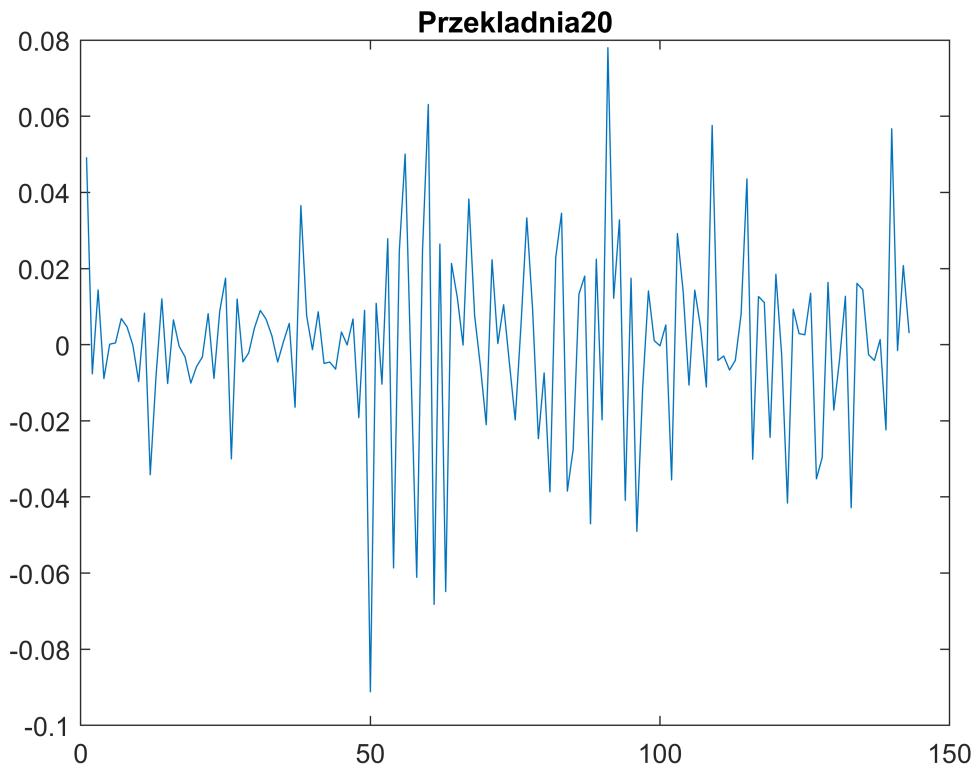
```
%Wiatrak24
[c, l] = wavedec(wiatrak24, num, falka);
[W24] = detcoef(c, l, num);
figure(32), plot(W24), title('Wiatrak24');
```



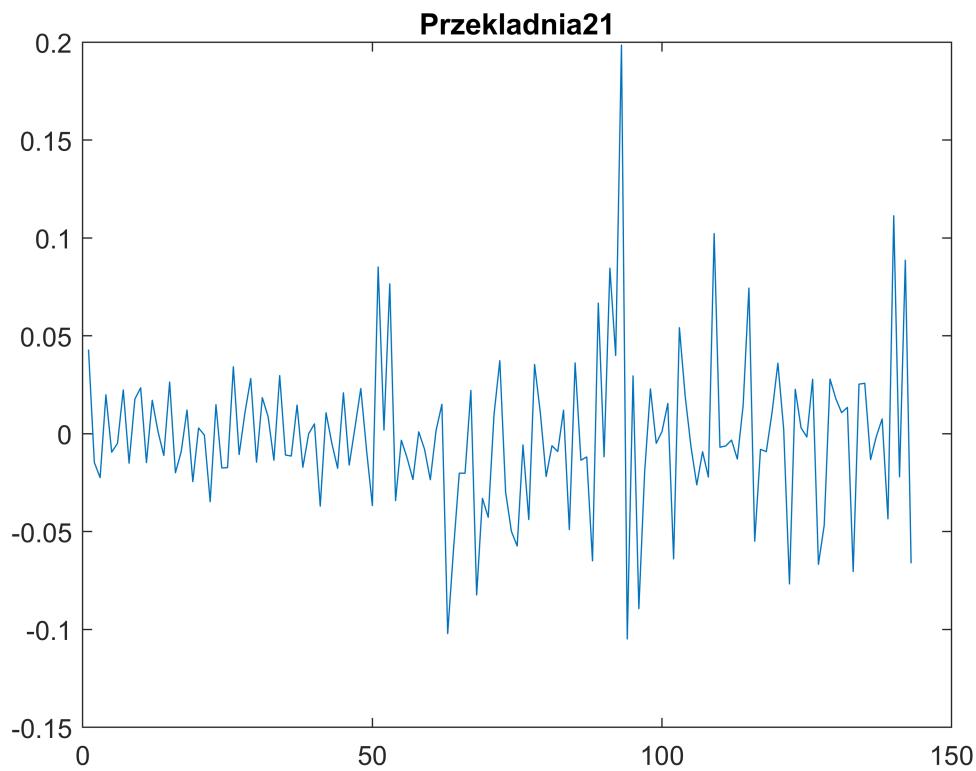
Zadanie 5

```
falka = 'dmey';
num = 10;

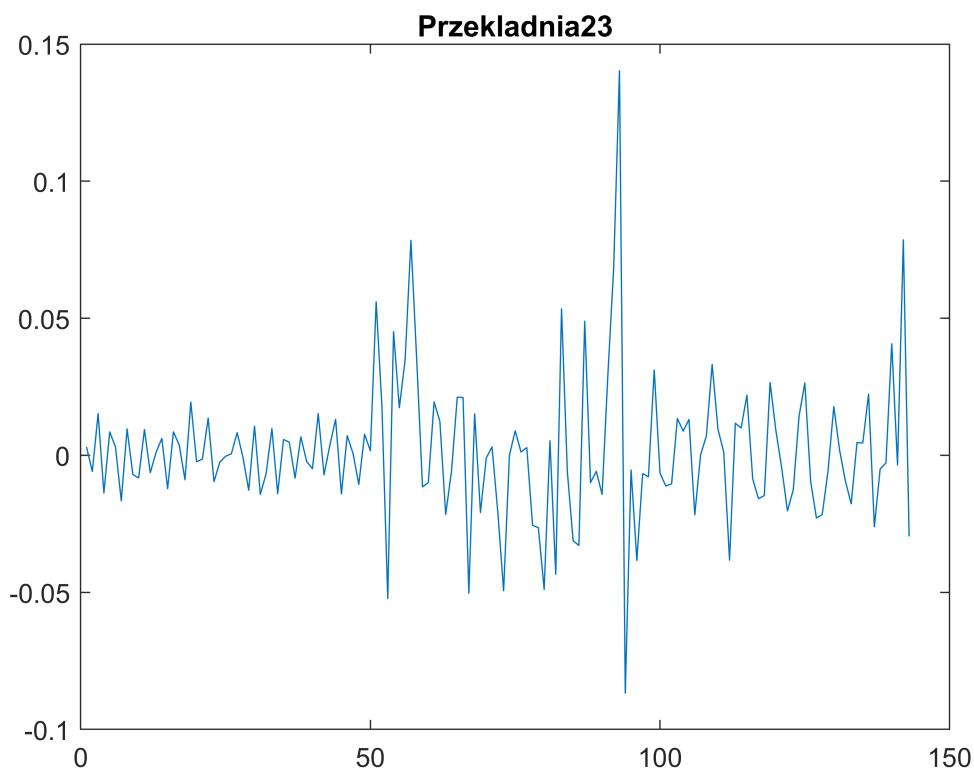
%Przekladnia20
[c, l] = wavedec(przekladnia20, num, falka);
[P20] = detcoef(c, l, num);
figure(33), plot(P20), title('Przekladnia20');
```



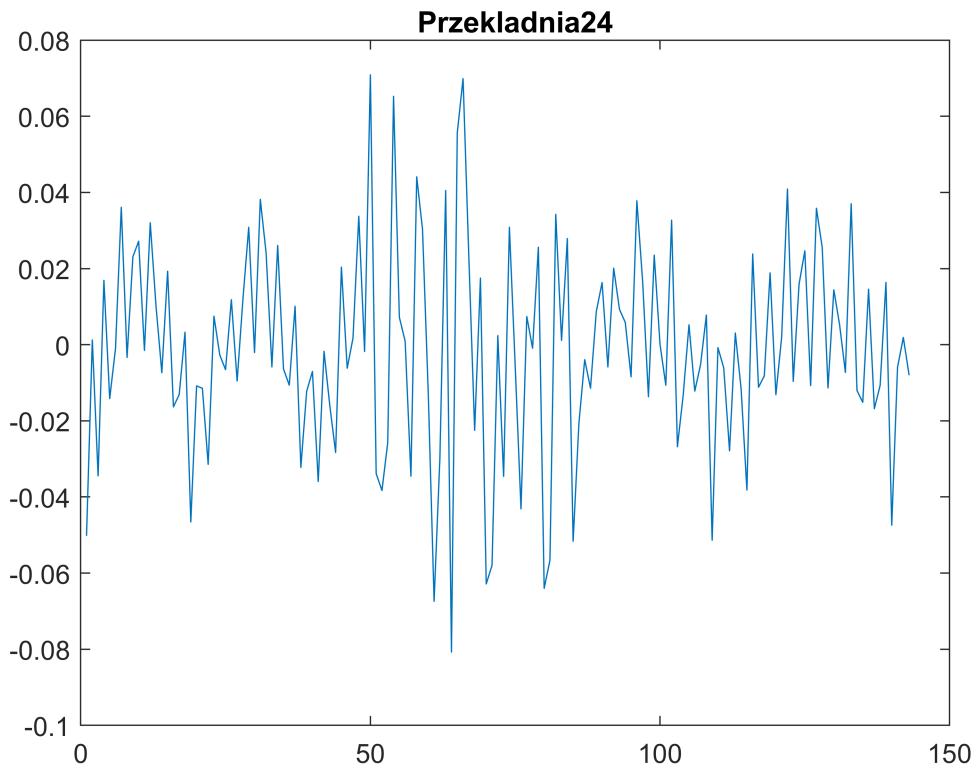
```
%Przekladnia21
[c, l] = wavedec(przekladnia21, num, falka);
[P21] = detcoef(c, l, num);
figure(34), plot(P21), title('Przekladnia21');
```



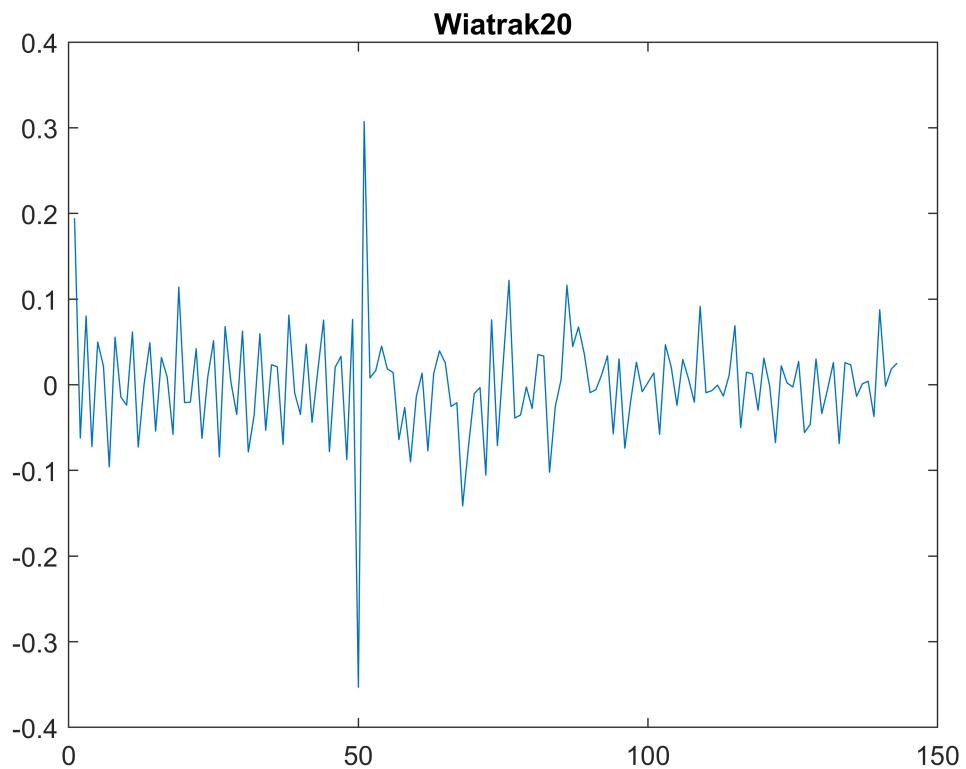
```
%Przekladnia23
[c, l] = wavedec(przekladnia23, num, falka);
[P23] = detcoef(c, l, num);
figure(35), plot(P23), title('Przekladnia23');
```



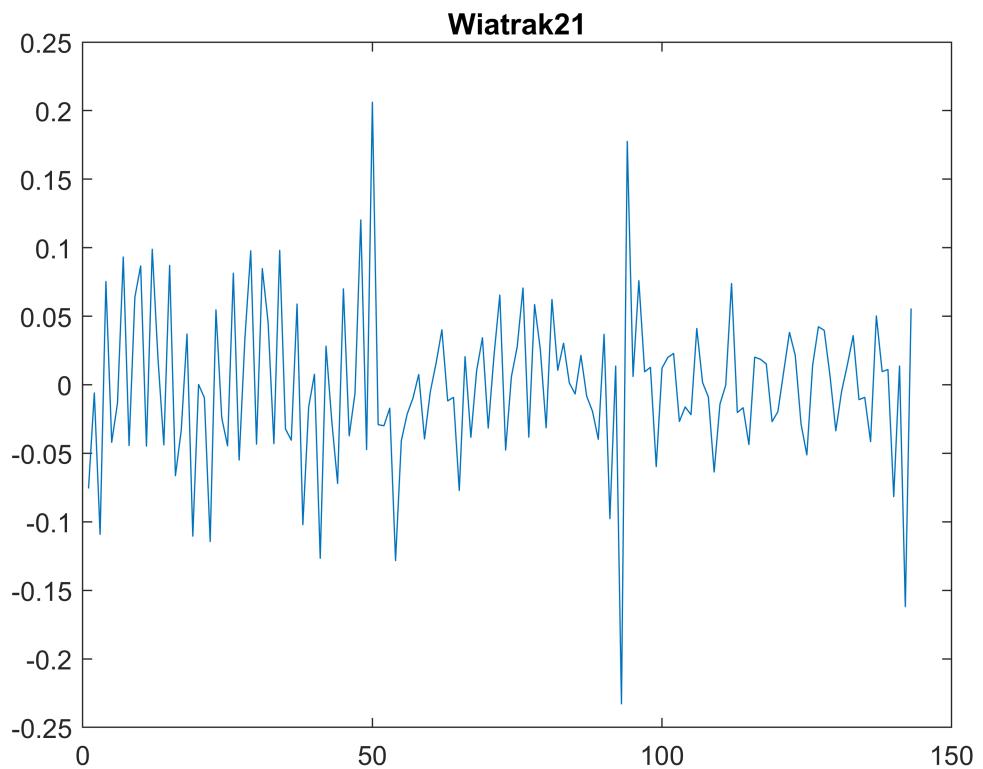
```
%Przekladnia24
[c, l] = wavedec(przekladnia24, num, falka);
[P24] = detcoef(c, l, num);
figure(36), plot(P24), title('Przekladnia24');
```



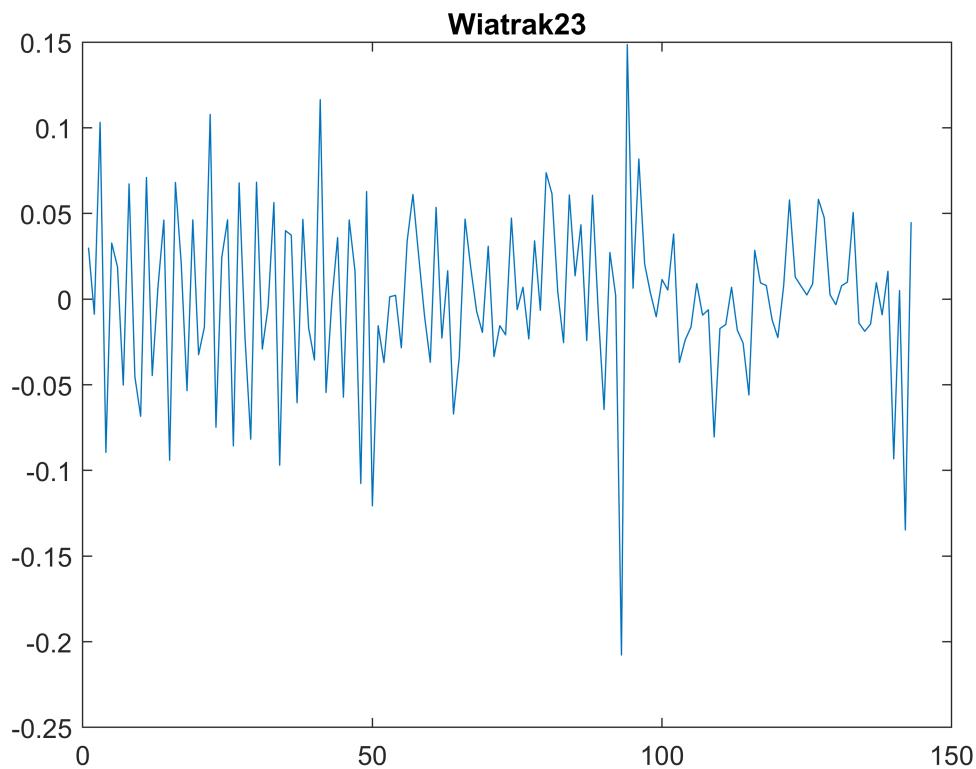
```
%Wiatrak20
[c, l] = wavedec(wiatrak20, num, falka);
[W20] = detcoef(c, l, num);
figure(37), plot(W20), title('Wiatrak20');
```



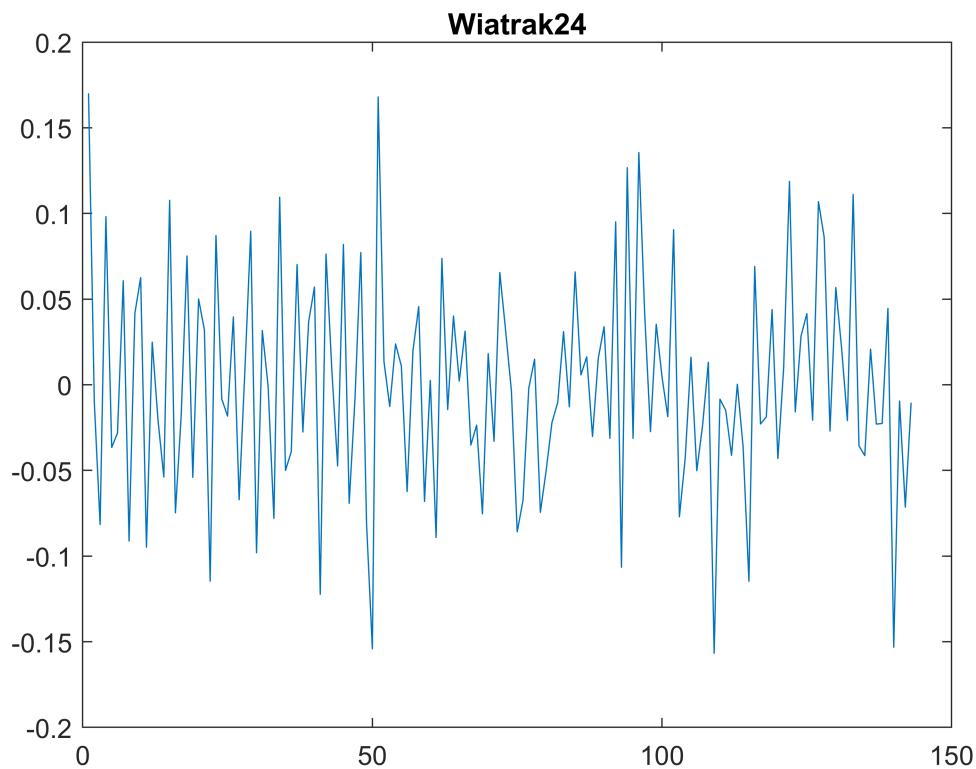
```
%Wiatrak21
[c, l] = wavedec(wiatrak21, num, falka);
[W21] = detcoef(c, l, num);
figure(38), plot(W21), title('Wiatrak21');
```



```
%Wiatrak23
[c, l] = wavedec(wiatrak23, num, falka);
[W23] = detcoef(c, l, num);
figure(39), plot(W23), title('Wiatrak23');
```



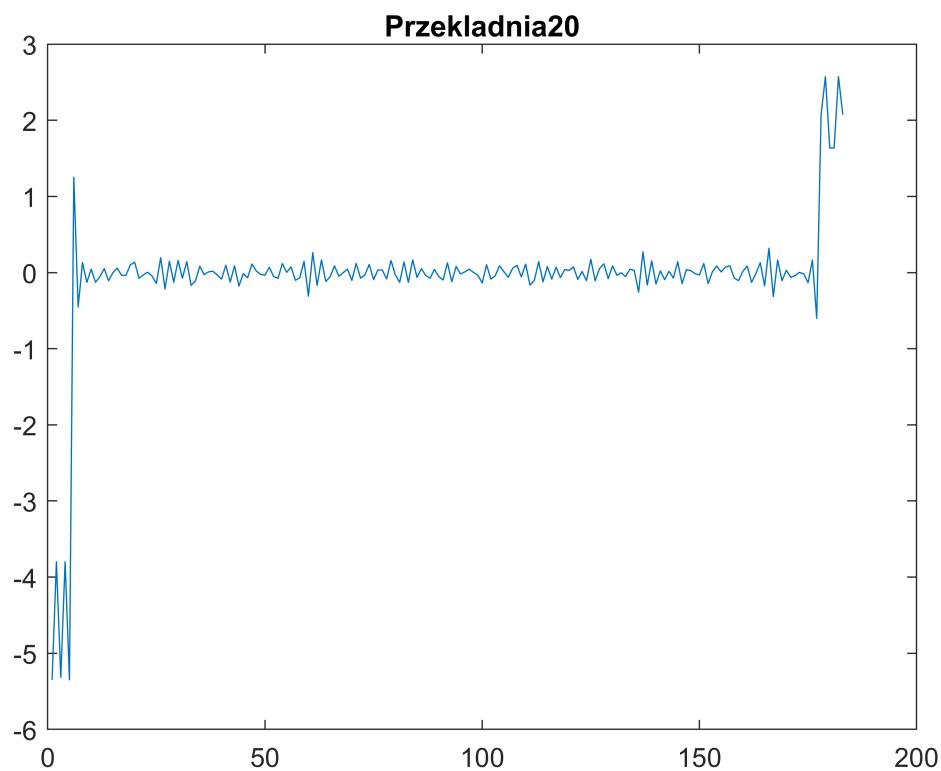
```
%Wiatrak24
[c, l] = wavedec(wiatrak24, num, falka);
[W24] = detcoef(c, l, num);
figure(40), plot(W24), title('Wiatrak24');
```



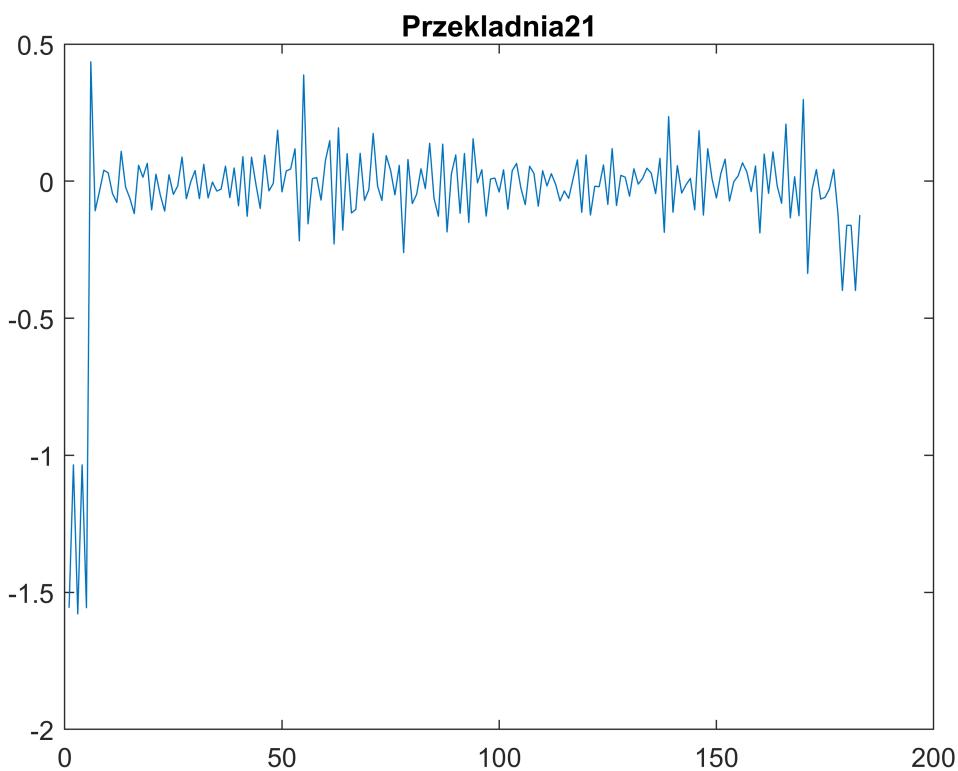
Zadanie 6

```
falka = 'bior3.5';
num = 8;

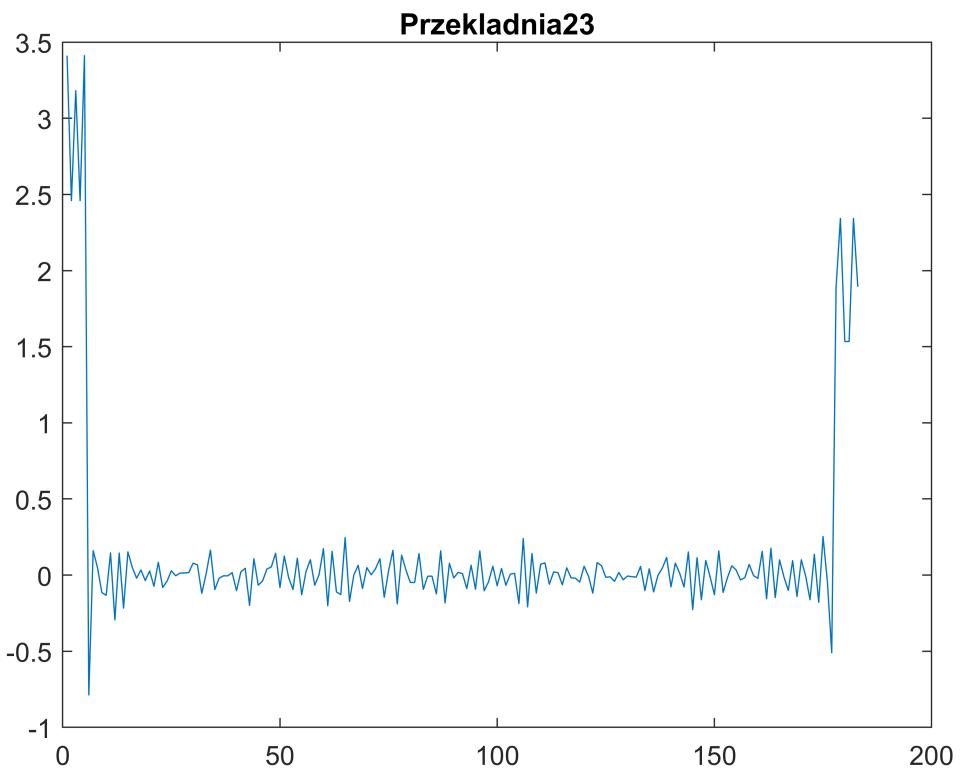
%Przekladnia20
[c, l] = wavedec(przekladnia20, num, falka);
[P20] = appcoef(c, l, falka, num);
figure(41), plot(P20), title('Przekladnia20');
```



```
%Przekladnia21
[c, l] = wavedec(przekladnia21, num, falka);
[P21] = appcoef(c, l, falka, num);
figure(42), plot(P21), title('Przekladnia21');
```

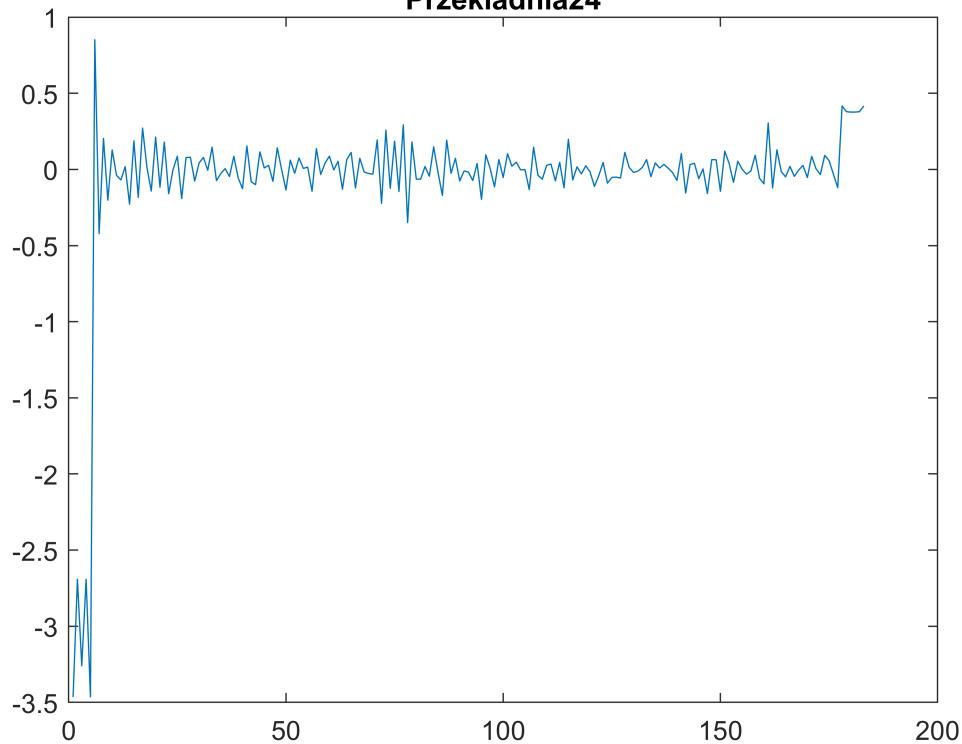


```
%Przekladnia23
[c, l] = wavedec(przekladnia23, num, falka);
[P23] = appcoef(c, l, falka, num);
figure(43), plot(P23), title('Przekladnia23');
```

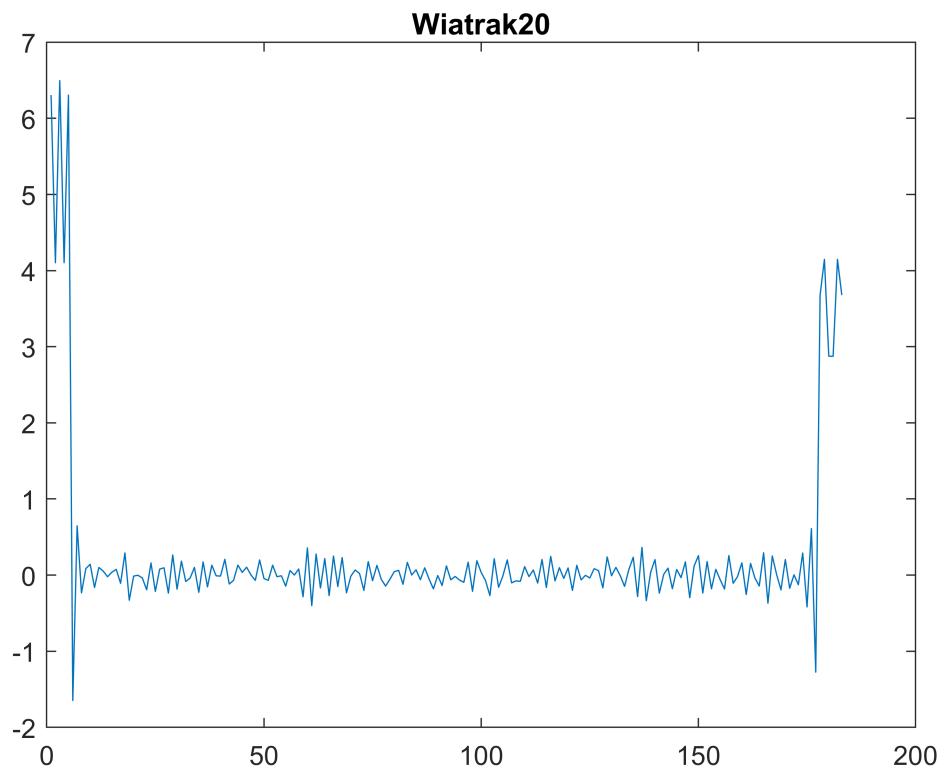


```
%Przekladnia24
[c, l] = wavedec(przekladnia24, num, falka);
[P24] = appcoef(c, l, falka, num);
figure(44), plot(P24), title('Przekladnia24');
```

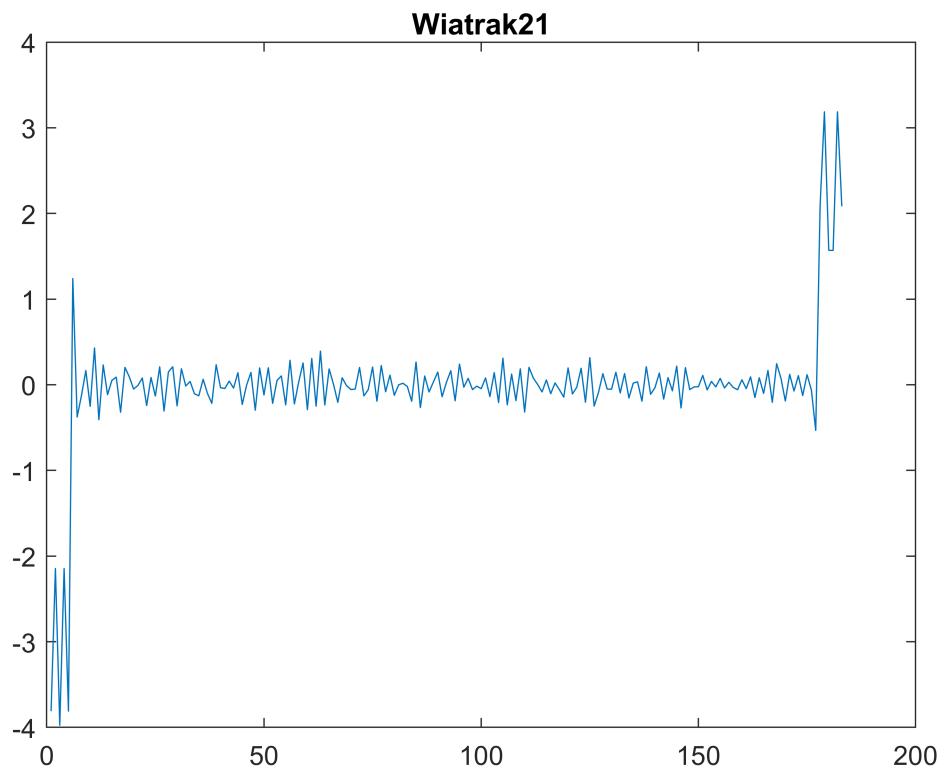
Przekladnia24



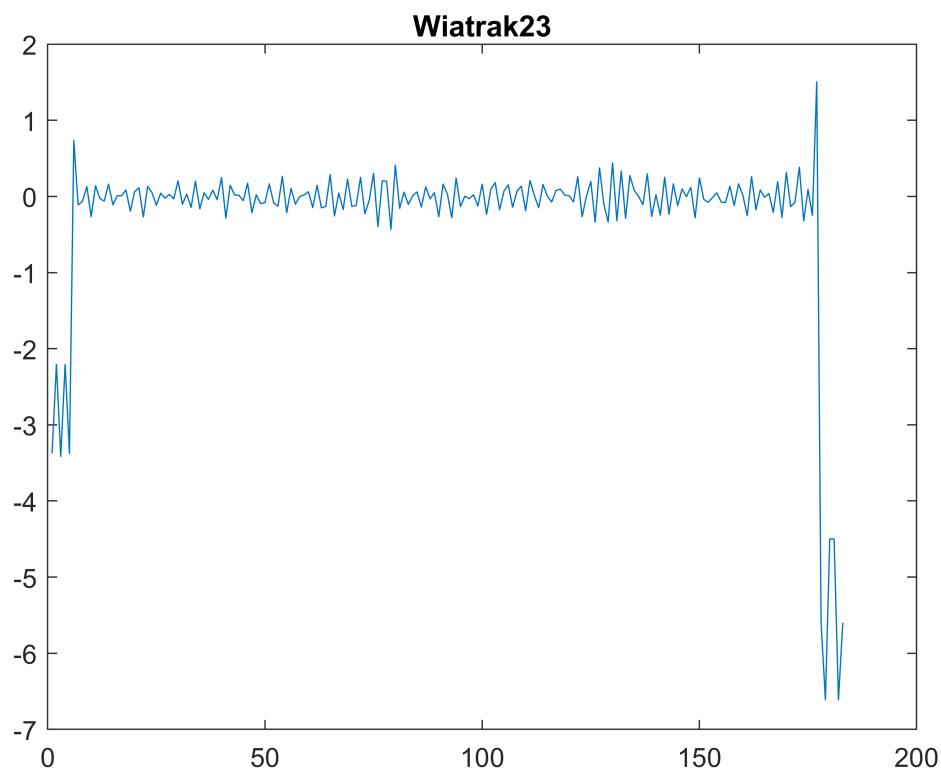
```
%Wiatrak20
[c, l] = wavedec(wiatrak20, num, falka);
[W20] = appcoef(c, l, falka, num);
figure(45), plot(W20), title('Wiatrak20');
```



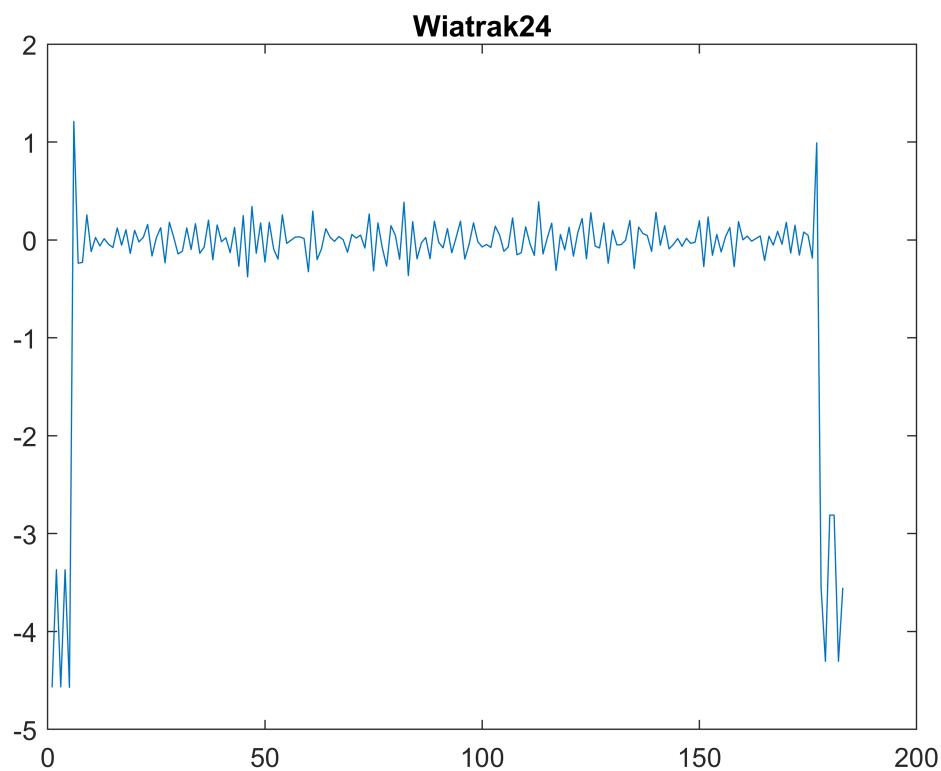
```
%Wiatrak21
[c, l] = wavedec(wiatrak21, num, falka);
[W21] = appcoef(c, l, falka, num);
figure(46), plot(W21), title('Wiatrak21');
```



```
%Wiatrak23
[c, l] = wavedec(wiatrak23, num, falka);
[W23] = appcoef(c, l, falka, num);
figure(47), plot(W23), title('Wiatrak23');
```

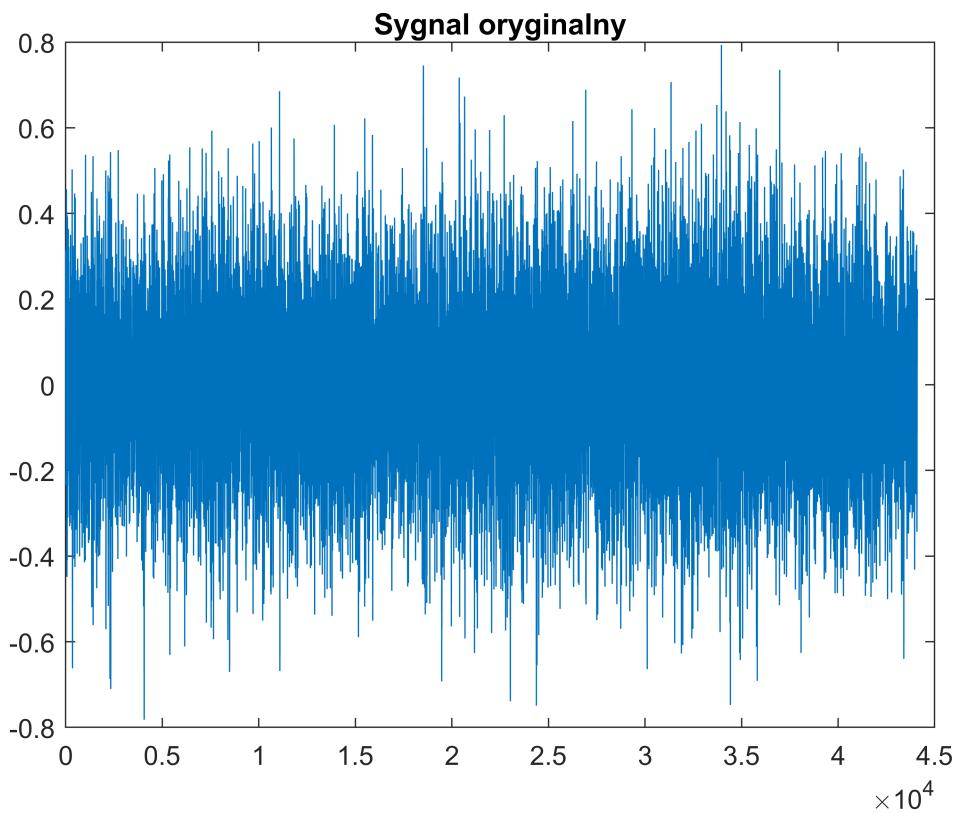


```
%Wiatrak24
[c, l] = wavedec(wiatrak24, num, falka);
[W24] = appcoef(c, l, falka, num);
figure(48), plot(W24), title('Wiatrak24');
```

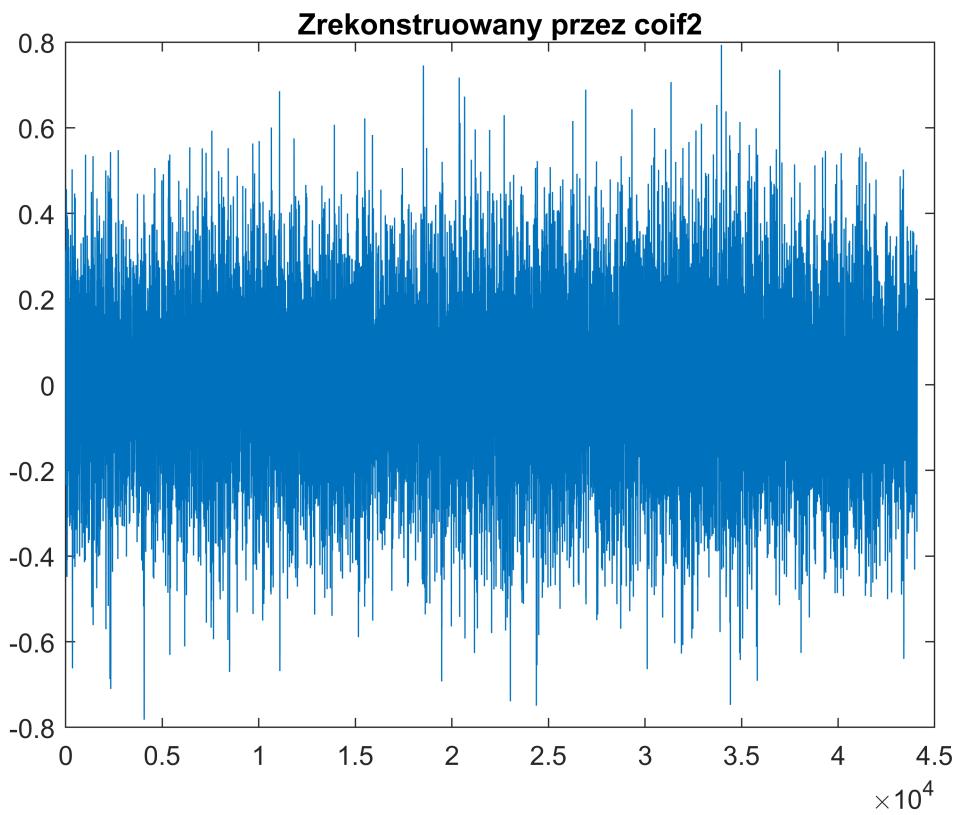


Zadanie 7

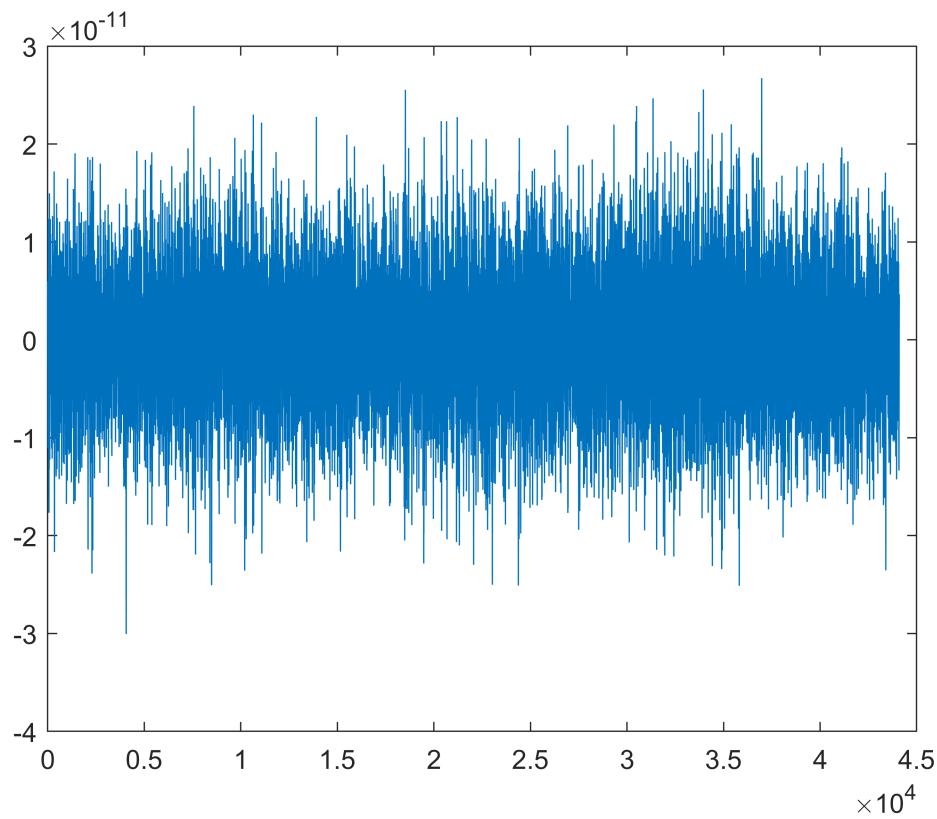
```
figure(49), plot(wiatrak20), title('Sygnal oryginalny');
```



```
[c,l] = wavedec(wiatrak20,6, 'coif2');
Rec = waverec(c,l,'coif2');
figure(50), plot(Rec), title('Zrekonstruowany przez coif2');
```

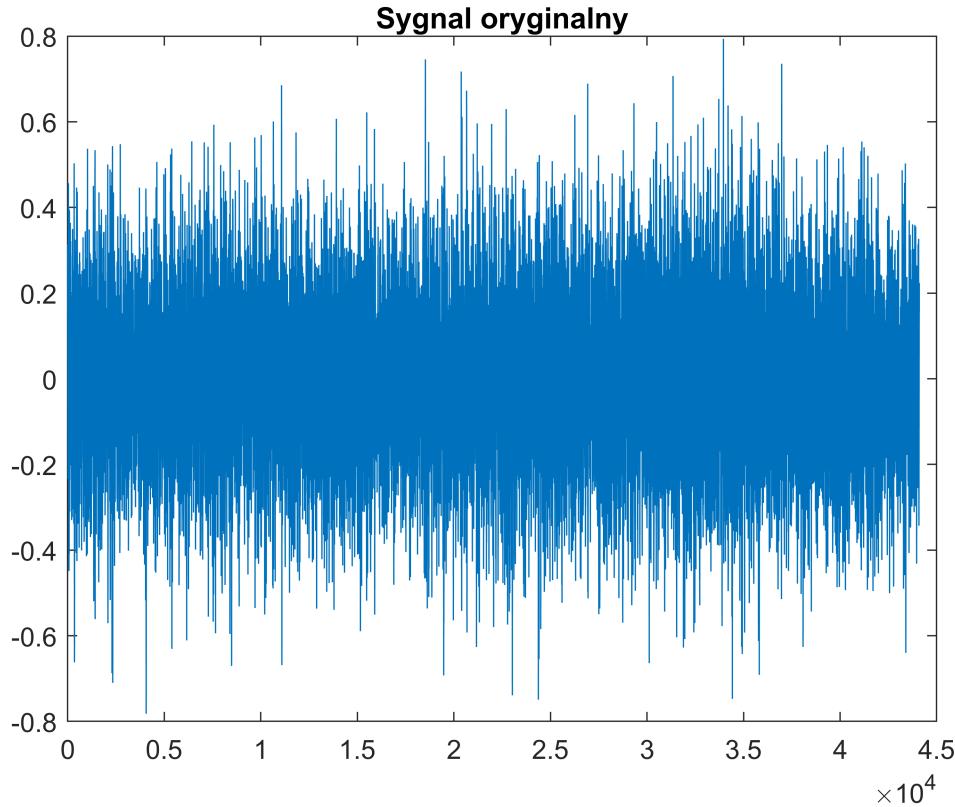


```
roznica = wiatrak20 - Rec;
figure(51), plot(roznica);
```

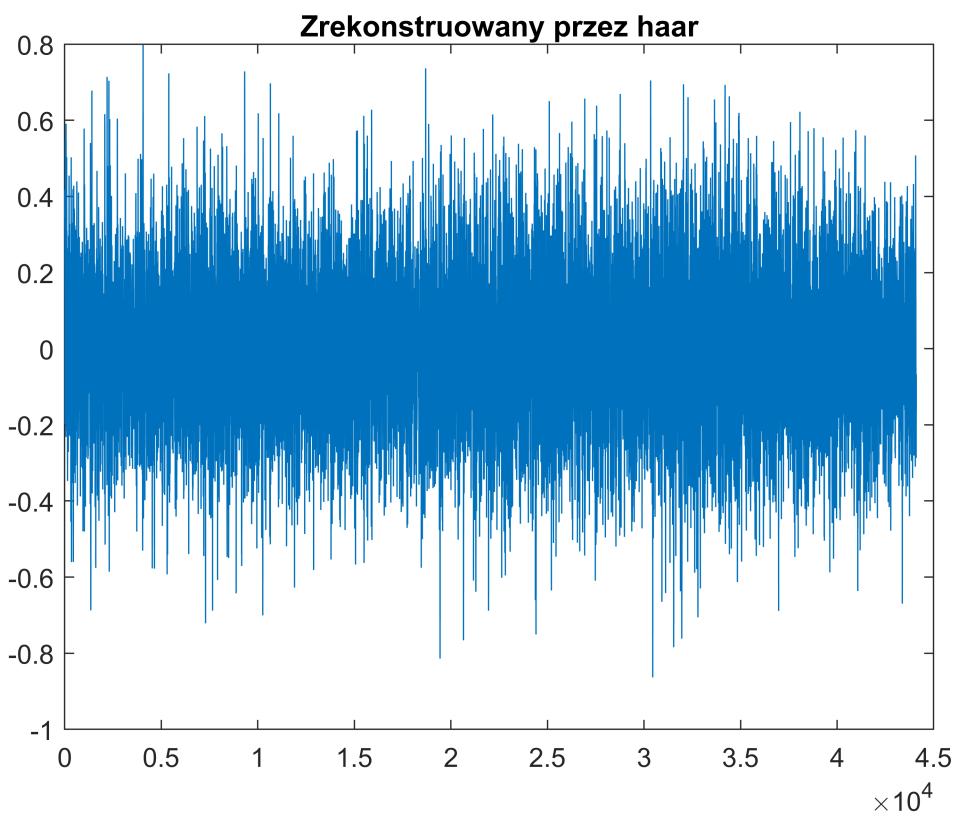


Zadanie 8

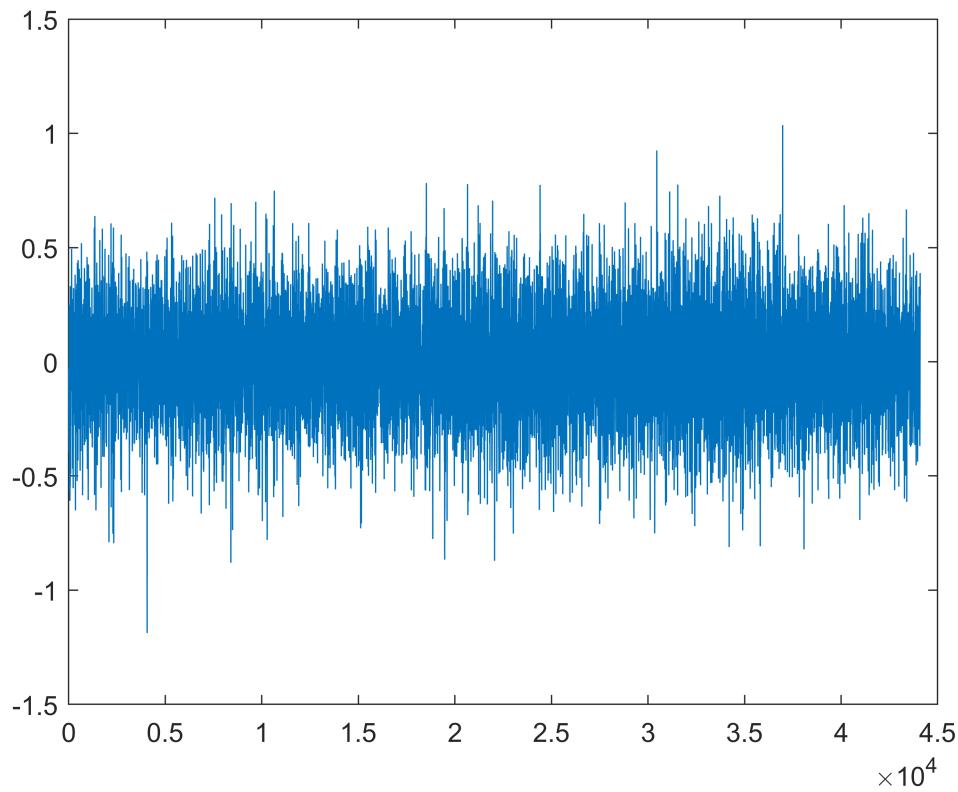
```
figure(52), plot(wiatrak20), title('Sygnal oryginalny');
```



```
[c,l] = wavedec(wiatrak20,6, 'coif2');
Rec = waverec(c,l,'haar');
figure(53), plot(Rec), title('Zrekonstruowany przez haar');
```



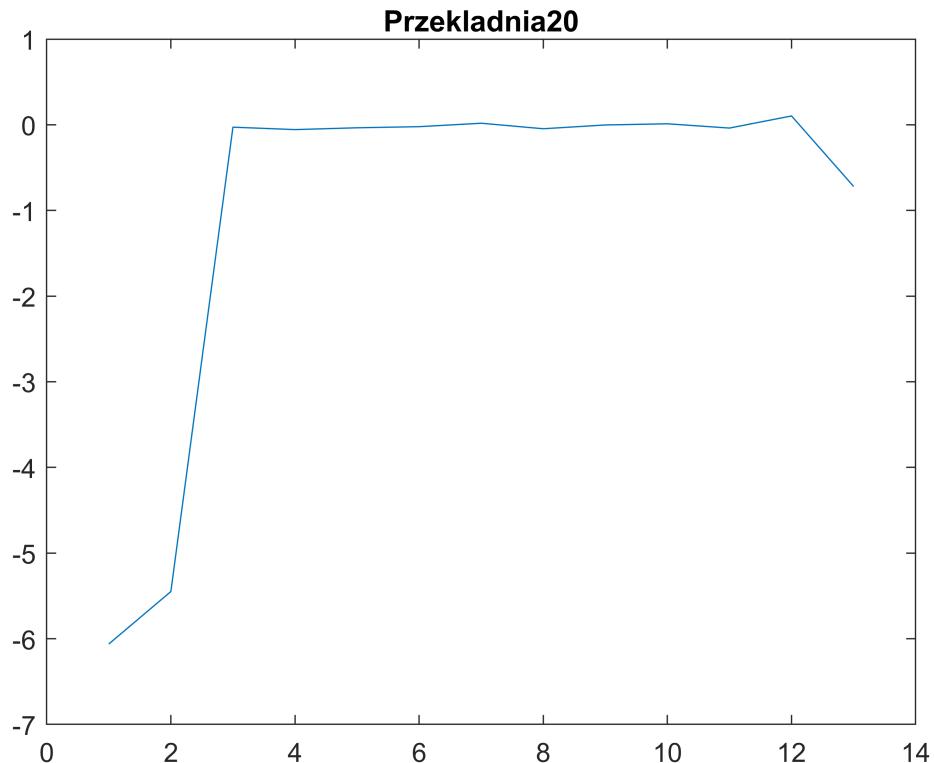
```
roznica = wiatrak20 - Rec;
figure(54), plot(roznica);
```



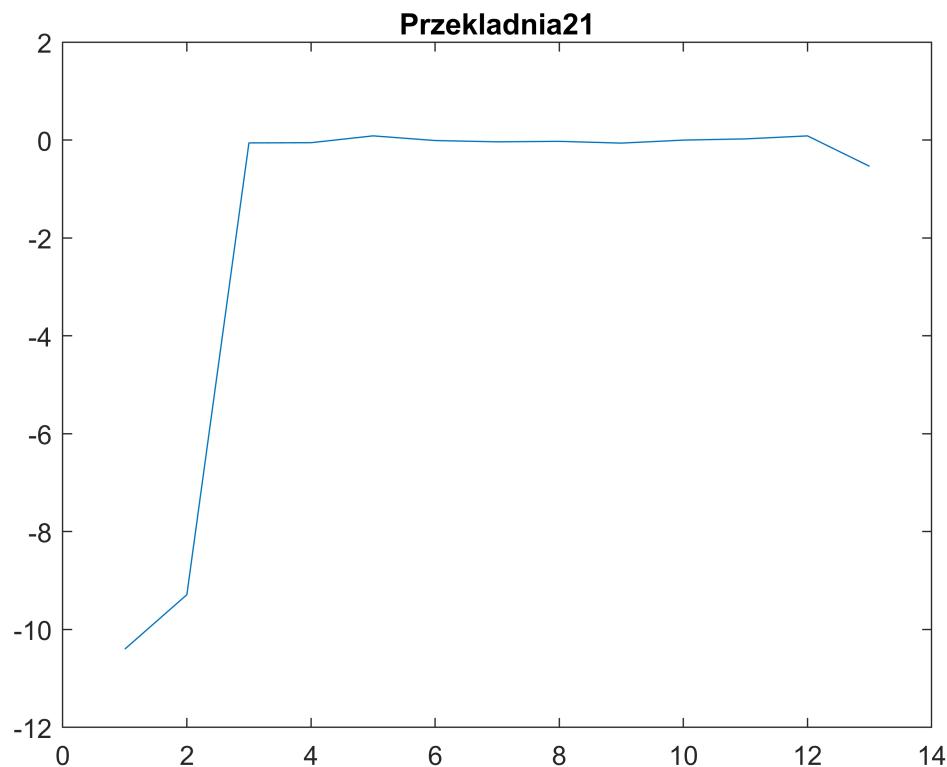
Zadanie 9

```
falka = 'sym2';
num = 12;

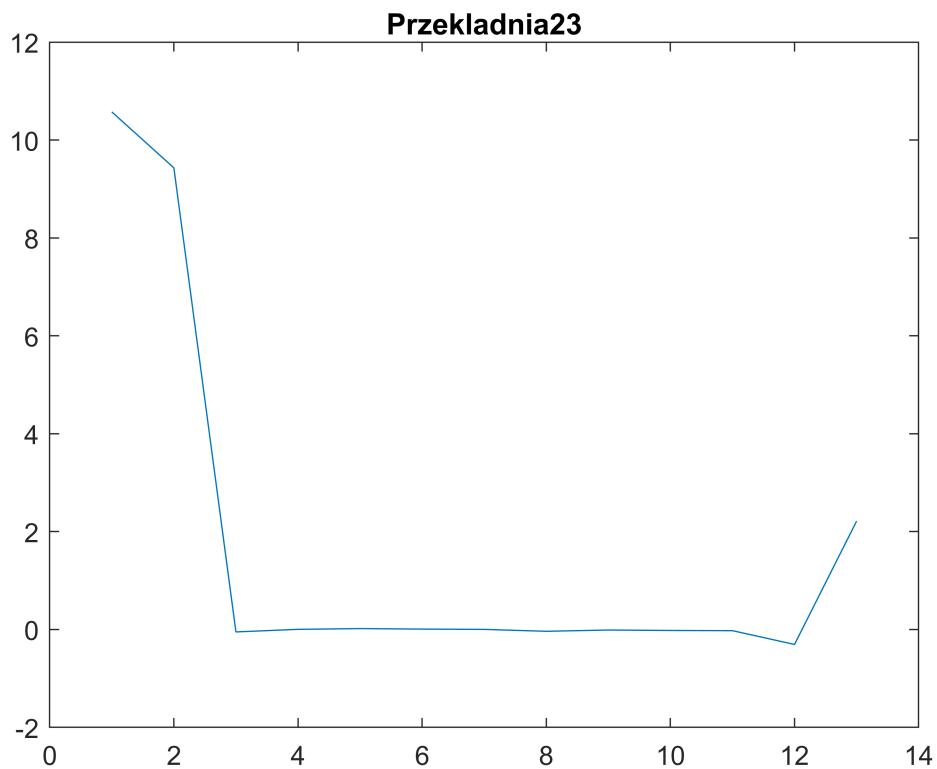
%Przekladnia20
[c, l] = wavedec(przekladnia20, num, falka);
[P20] = appcoef(c, l, falka, num);
figure(55), plot(P20), title('Przekladnia20');
```



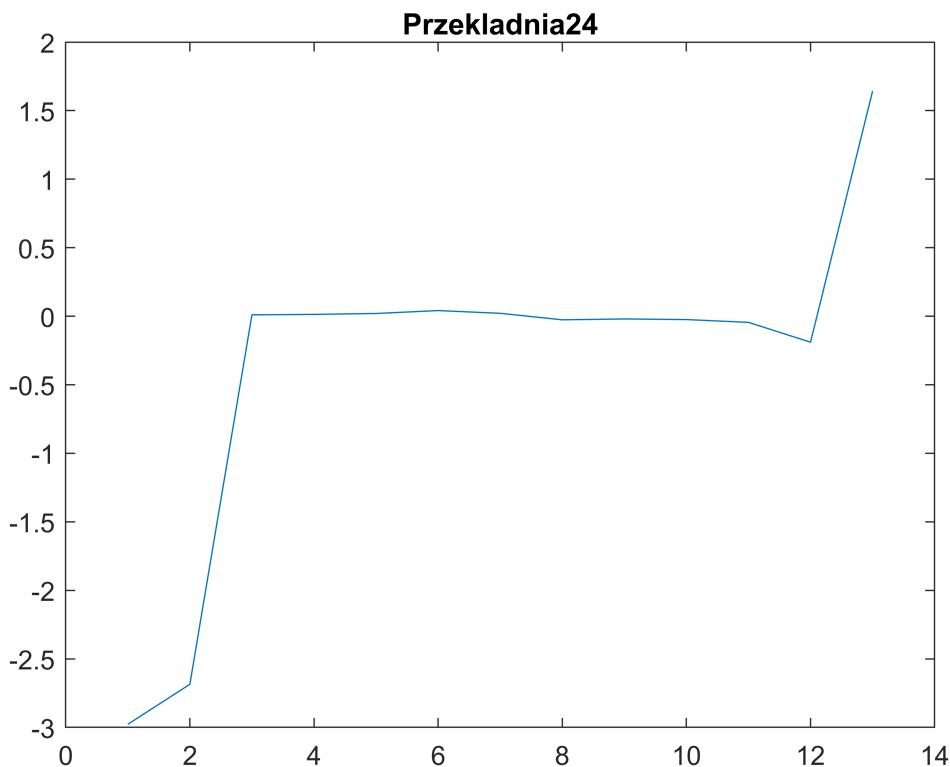
```
%Przekladnia21
[c, l] = wavedec(przekladnia21, num, falka);
[P21] = appcoef(c, l, falka, num);
figure(56), plot(P21), title('Przekladnia21');
```



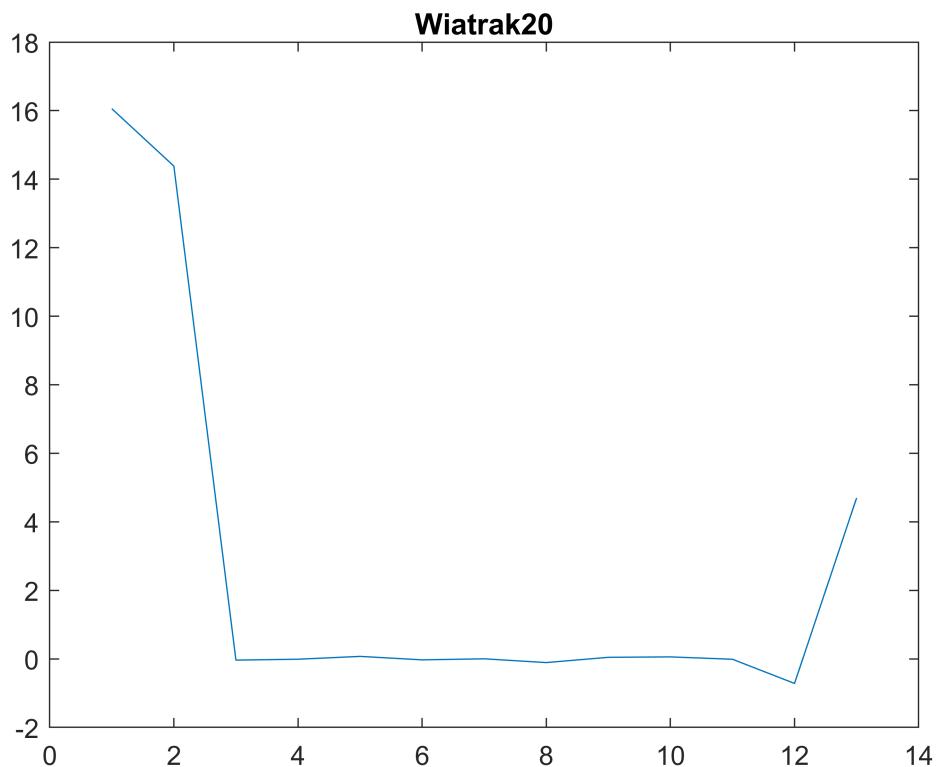
```
%Przekladnia23
[c, l] = wavedec(przekladnia23, num, falka);
[P23] = appcoef(c, l, falka, num);
figure(57), plot(P23), title('Przekladnia23');
```



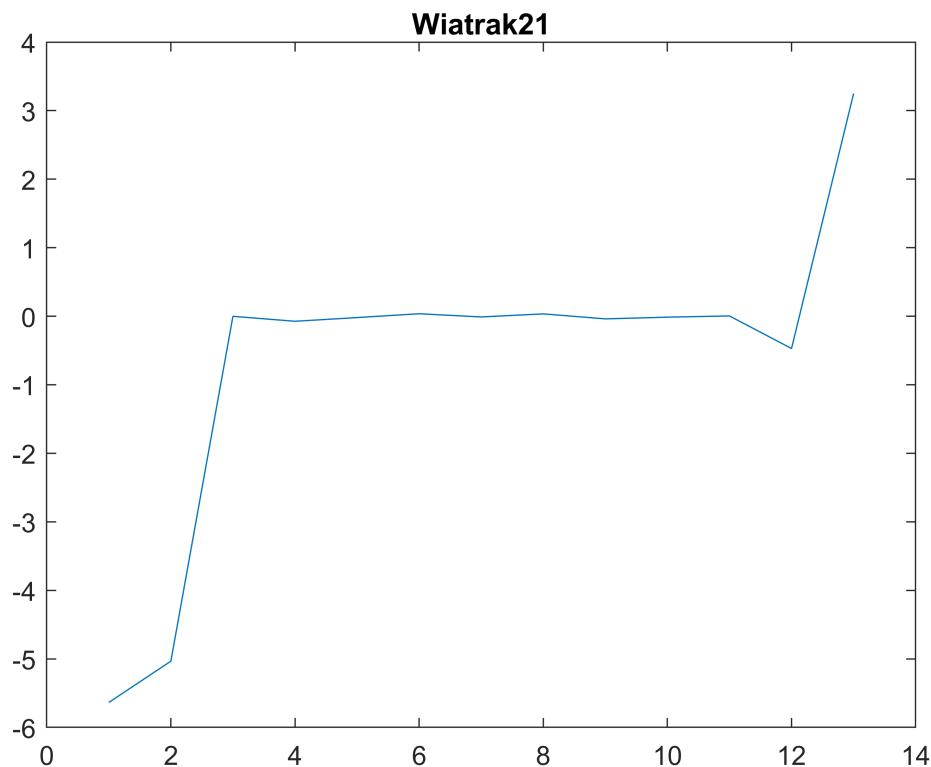
```
%Przekladnia24
[c, l] = wavedec(przekladnia24, num, falka);
[P24] = appcoef(c, l, falka, num);
figure(58), plot(P24), title('Przekladnia24');
```



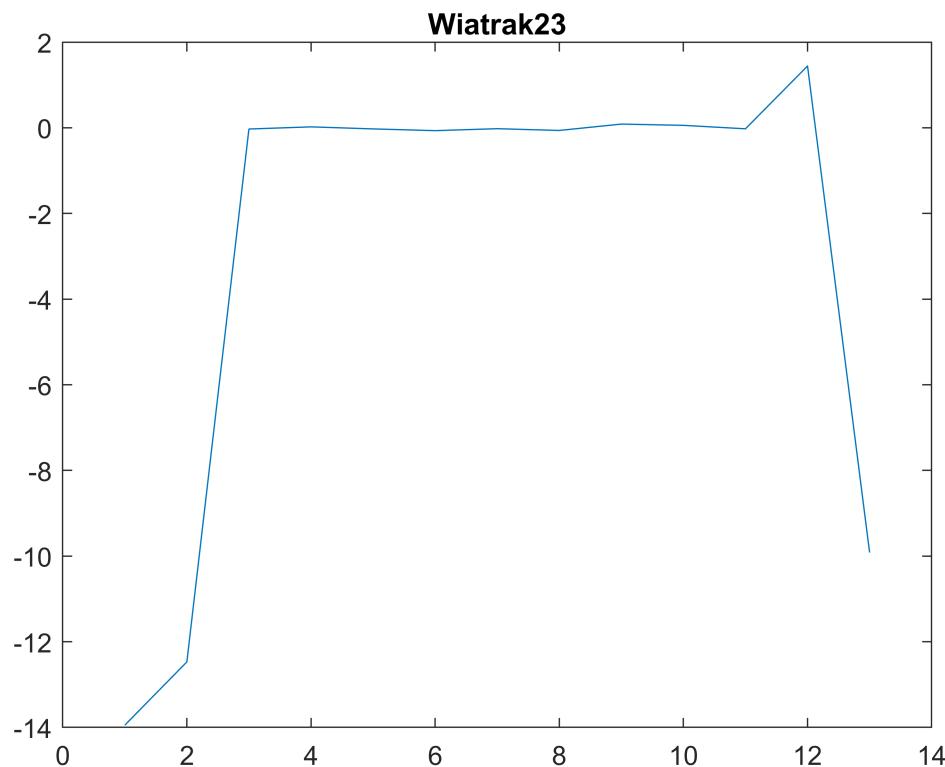
```
%Wiatrak20
[c, l] = wavedec(wiatrak20, num, falka);
[W20] = appcoef(c, l, falka, num);
figure(59), plot(W20), title('Wiatrak20');
```



```
%Wiatrak21
[c, l] = wavedec(wiatrak21, num, falka);
[W21] = appcoef(c, l, falka, num);
figure(60), plot(W21), title('Wiatrak21');
```

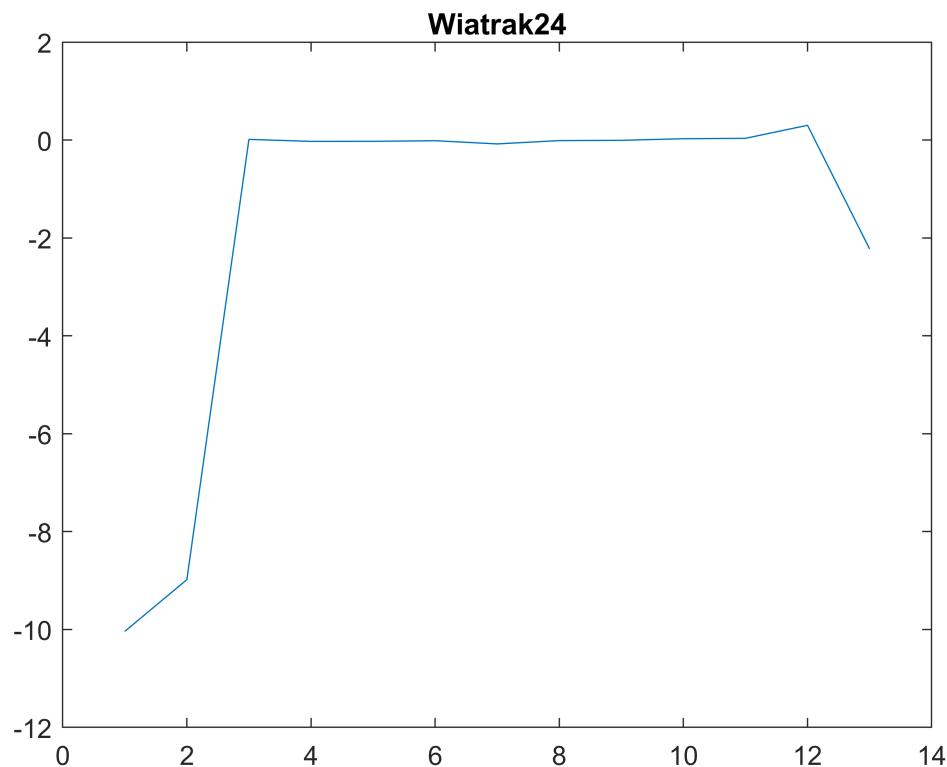


```
%Wiatrak23
[c, l] = wavedec(wiatrak23, num, falka);
[W23] = appcoef(c, l, falka, num);
figure(61), plot(W23), title('Wiatrak23');
```



```
%Wiatrak24
```

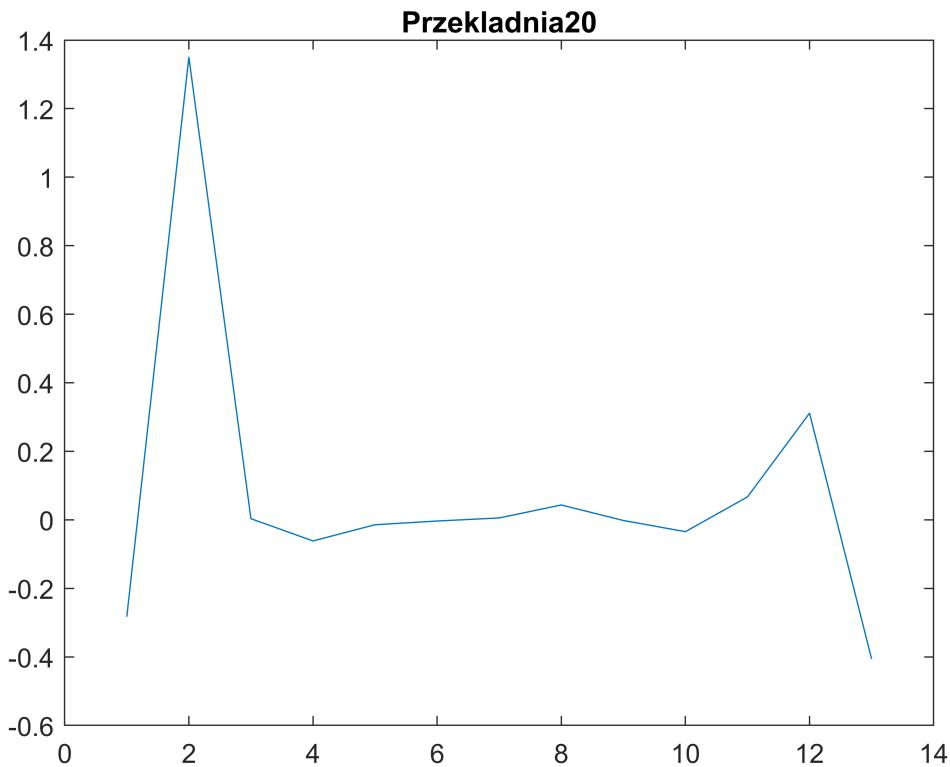
```
[c, l] = wavedec(wiatrak24, num, falka);
[W24] = appcoef(c, l, falka, num);
figure(62), plot(W24), title('Wiatrak24');
```



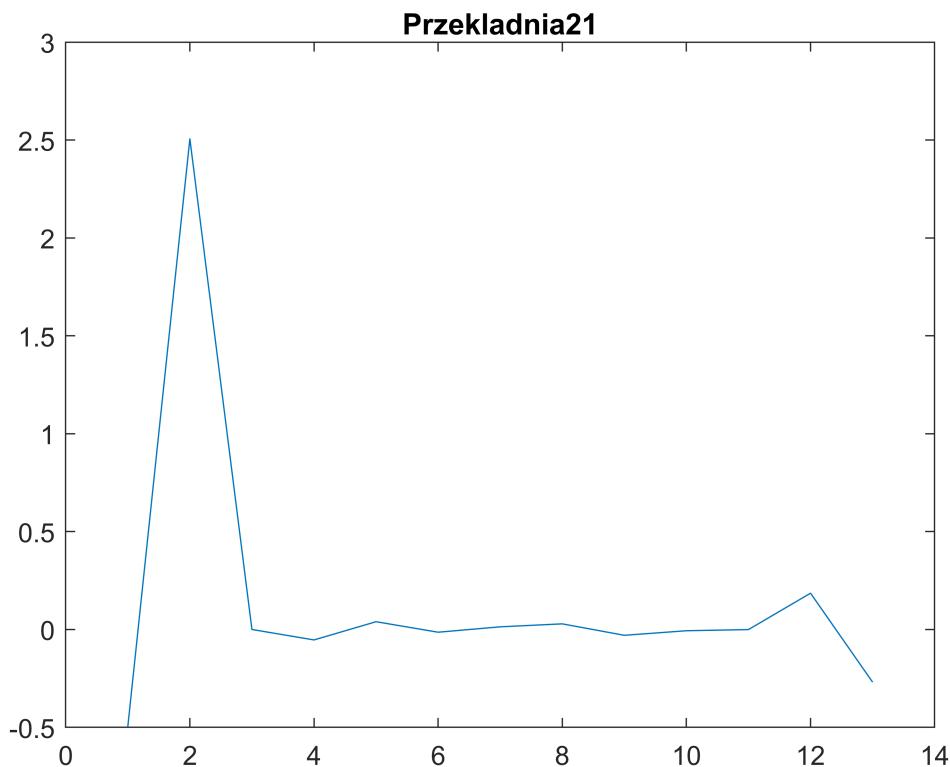
Zadanie 10

```
falka = 'sym2';
num = 12;

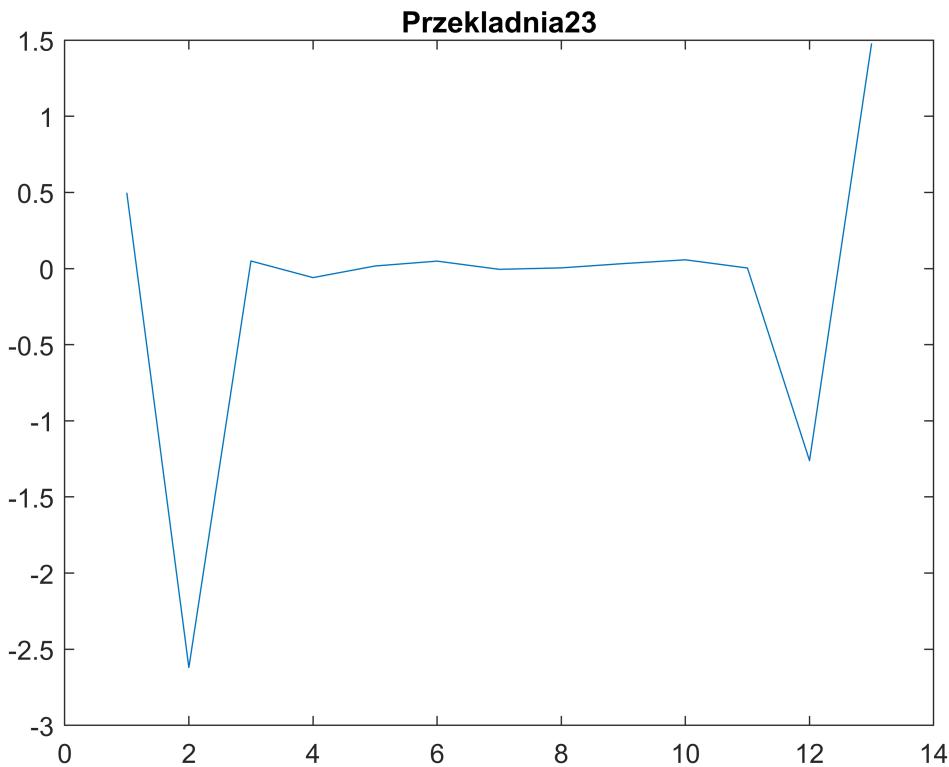
%Przekladnia20
[c, l] = wavedec(przekladnia20, num, falka);
[P20] = detcoef(c, l, num);
figure(63), plot(P20), title('Przekladnia20');
```



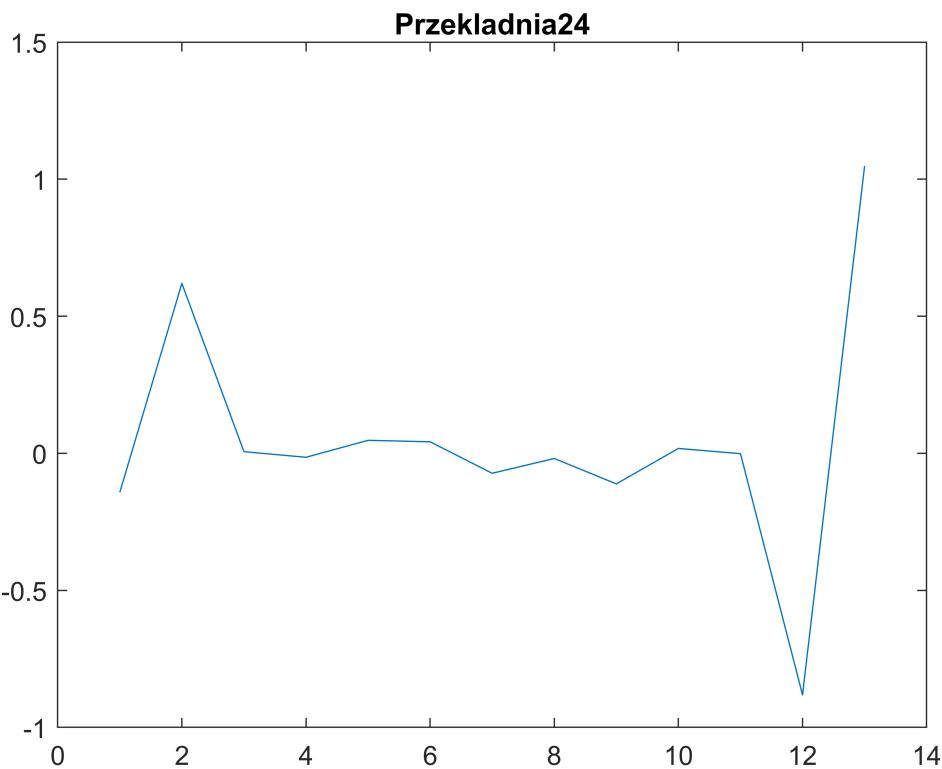
```
%Przekladnia21
[c, l] = wavedec(przekladnia21, num, falka);
[P21] = detcoef(c, l, num);
figure(64), plot(P21), title('Przekladnia21');
```



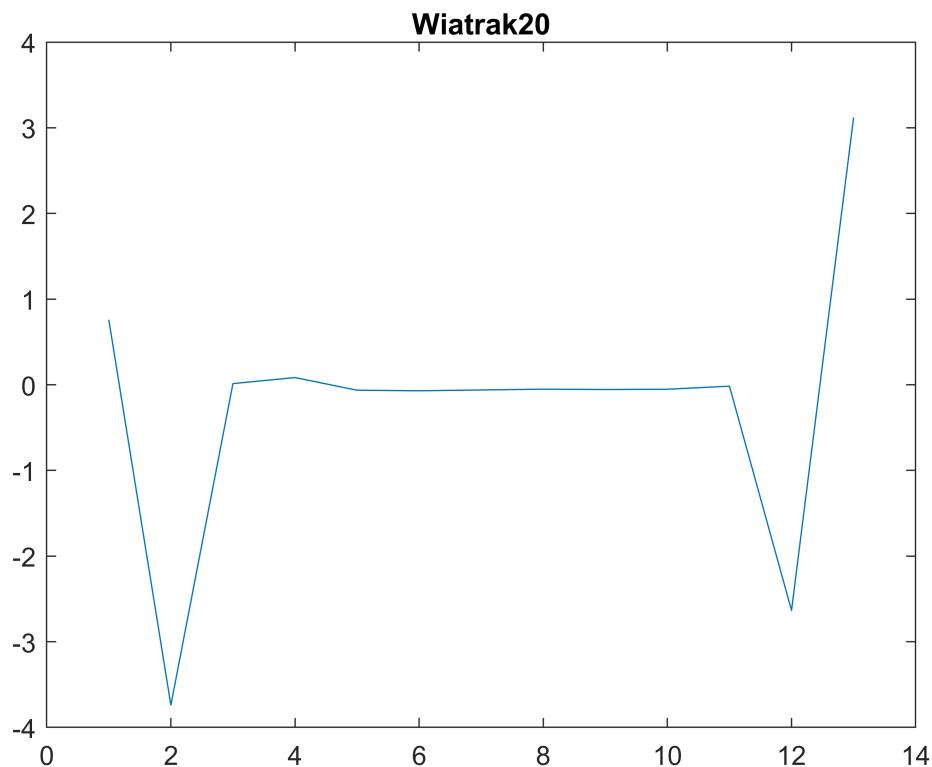
```
%Przekladnia23
[c, l] = wavedec(przekladnia23, num, falka);
[P23] = detcoef(c, l, num);
figure(65), plot(P23), title('Przekladnia23');
```



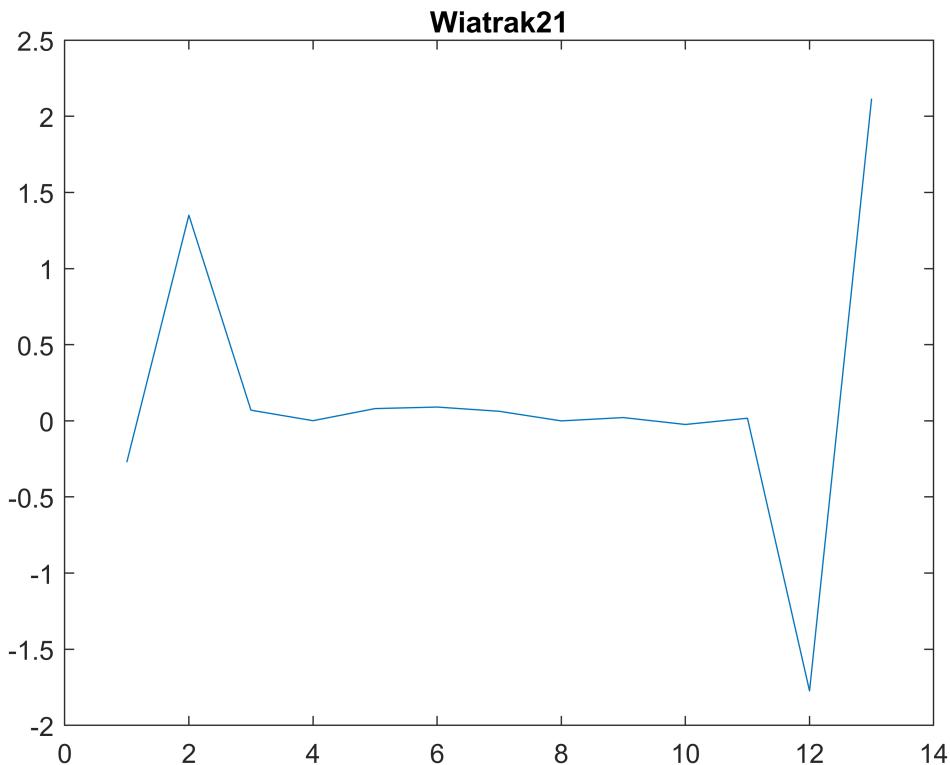
```
%Przekladnia24
[c, l] = wavedec(przekladnia24, num, falka);
[P24] = detcoef(c, l, num);
figure(66), plot(P24), title('Przekladnia24');
```



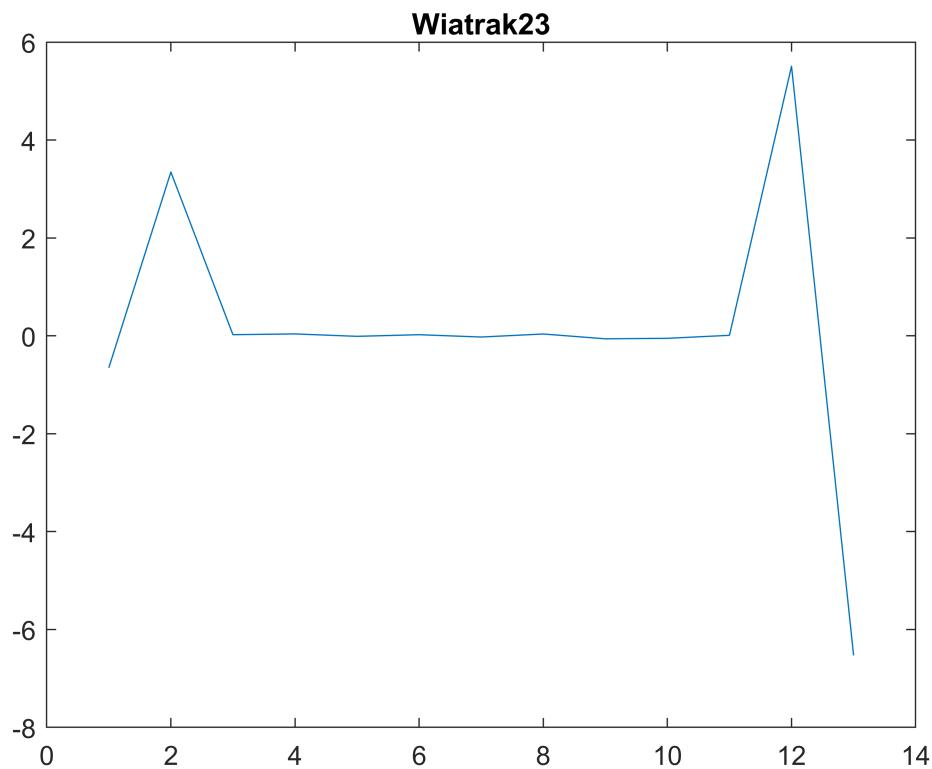
```
%Wiatrak20
[c, l] = wavedec(wiatrak20, num, falka);
[W20] = detcoef(c, l, num);
figure(67), plot(W20), title('Wiatrak20');
```



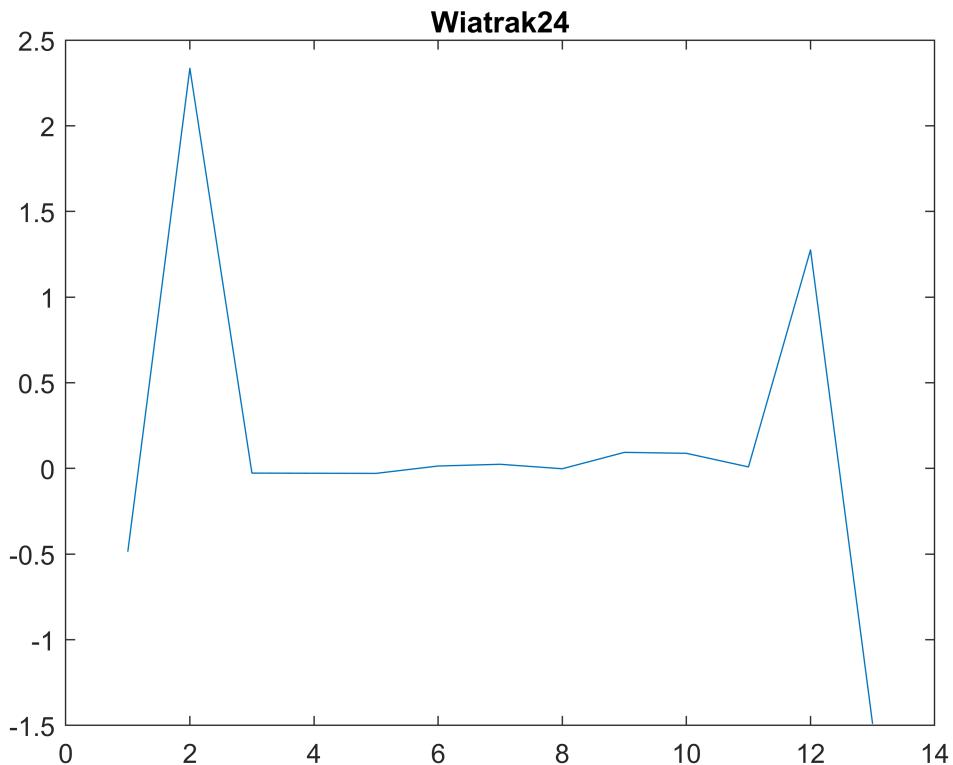
```
%Wiatrak21
[c, l] = wavedec(wiatrak21, num, falka);
[W21] = detcoef(c, l, num);
figure(68), plot(W21), title('Wiatrak21');
```



```
%Wiatrak23
[c, l] = wavedec(wiatrak23, num, falka);
[W23] = detcoef(c, l, num);
figure(69), plot(W23), title('Wiatrak23');
```



```
%Wiatrak24
[c, l] = wavedec(wiatrak24, num, falka);
[W24] = detcoef(c, l, num);
figure(70), plot(W24), title('Wiatrak24');
```



Pytania

1) W jaki sposób zastosować falki do ekstrakcji cech?

Robi się transformacje falkowa i analizuje współczynniki - bierze się wysokie współczynniki, żeby mieć mniej cech do analizy.

2) Jakie parametry falek możemy zmieniać w toolboxie?

W samym toolboxie waveletAnalyzer możemy wybrać rodzaj falki i poziom dekompozycji.

3) Czym różnią się współczynniki $a_1, d_1, d_2, d_3, d_4, d_5$?

Współczynniki $Aj(k)$ przedstawiają niskie częstotliwości z mniejszą dokładnością - stanowią aproksymacje sygnału, natomiast $Dj(k)$ przedstawiają wysokie częstotliwości z wysoką dokładnością - stanowią zbiór cech.

4) Czym różni się transformacja falkowa od filtrów?

Za pomocą filtrów możemy zrekonstruować sygnał na podstawie transformacji falkowej.