Milena Michalska, nr Albumu 39362

# Sprawozdanie z lab nr 4

## Modulacja ciągła

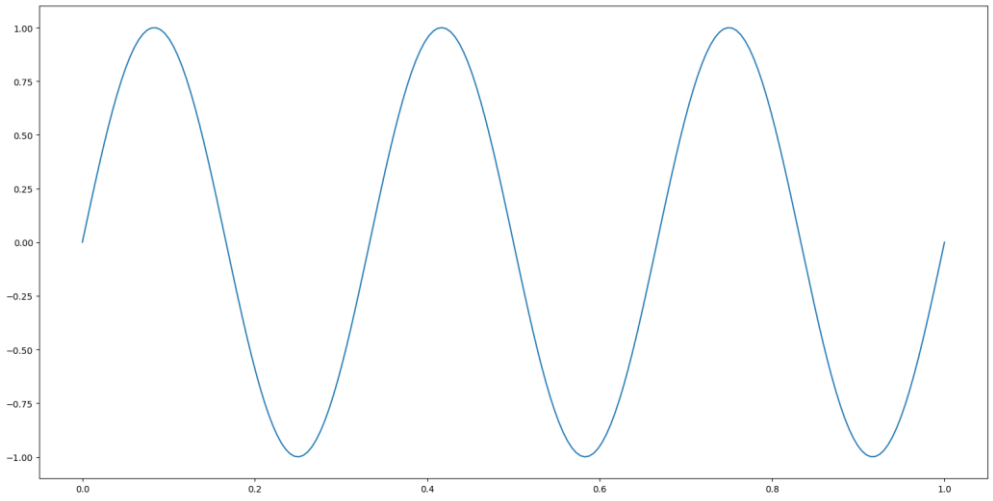
## Zadanie 1

1) Wygeneruj sygnały zmodulowane $z_A(t)$ oraz $z_P(t)$ dla następujących przypadków:

a) $1 > k_A > 0$; $k_P < 2$;

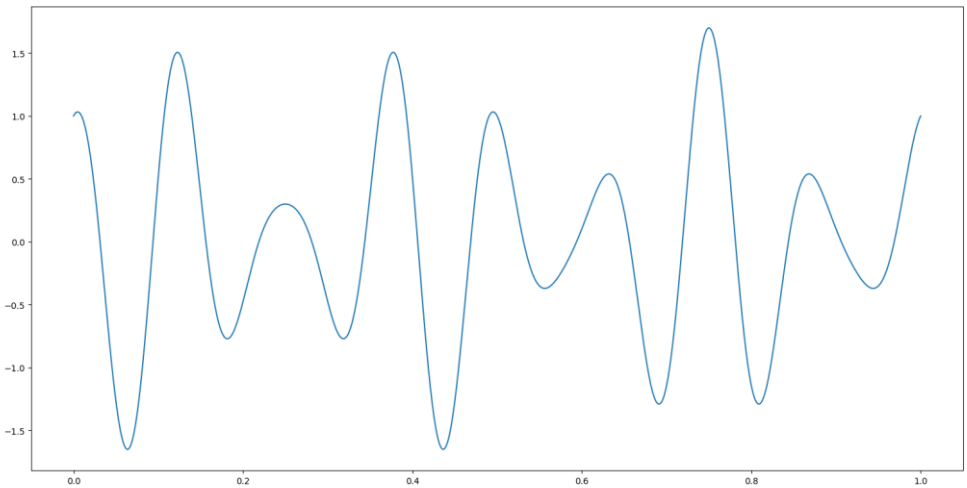
b) $12 > k_A > 2$; $\pi > k_P > 0$;

c) $k_A > \widehat{B}\widehat{A}$; $k_P > \widehat{A}\widehat{B}$



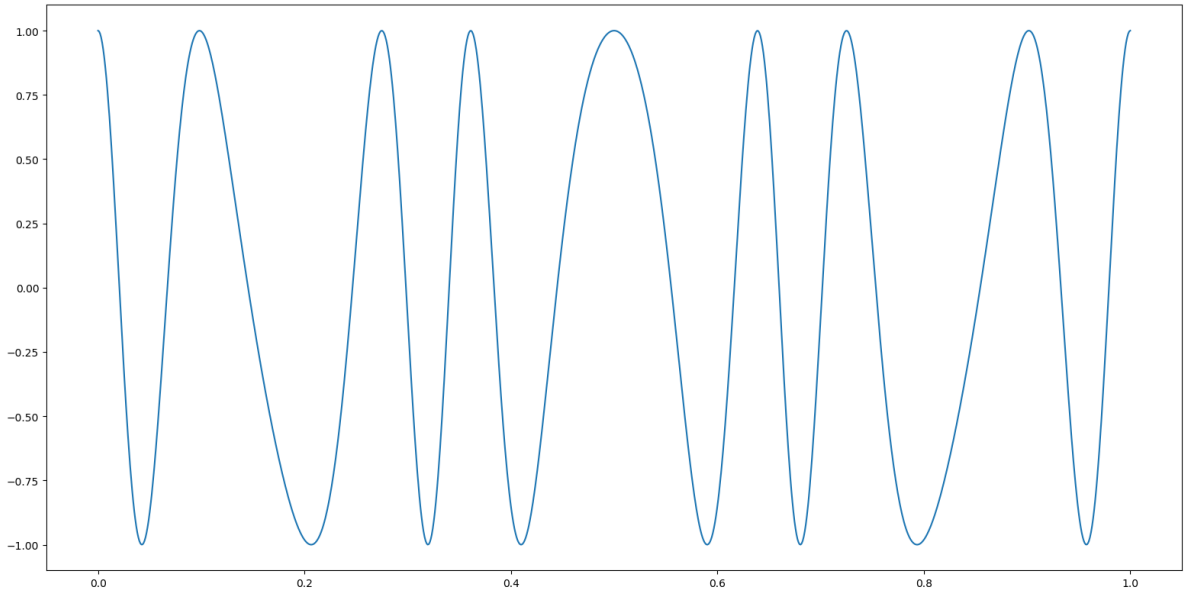

k_A = 0.7

k_P = 1.4



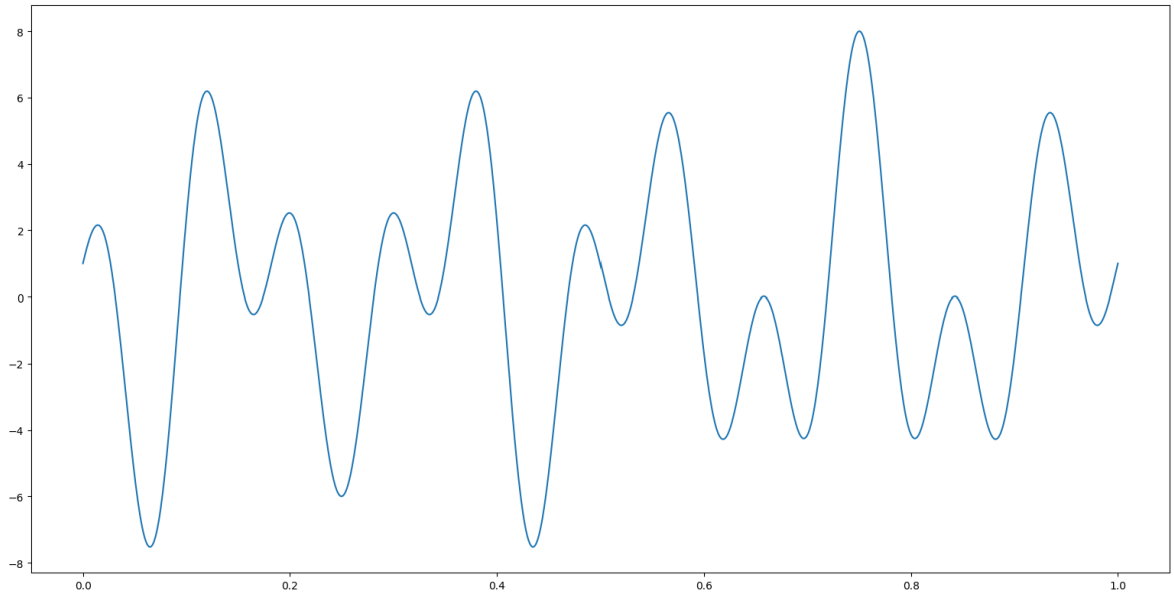
k_A = 7

k_P = 1/4 * np.pi



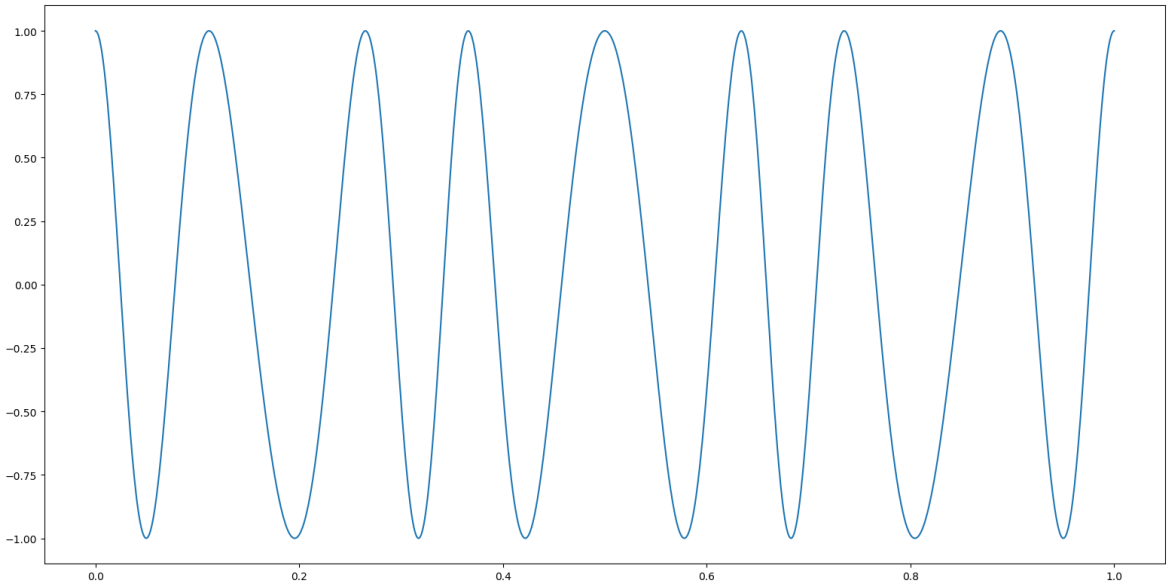

k_A = 64

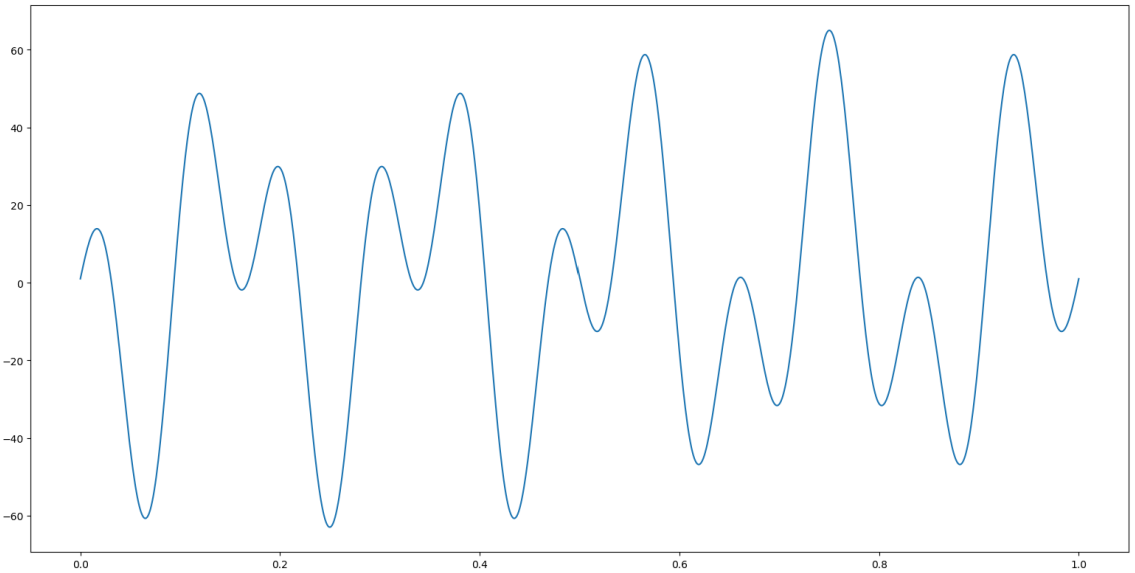
k_P = 32

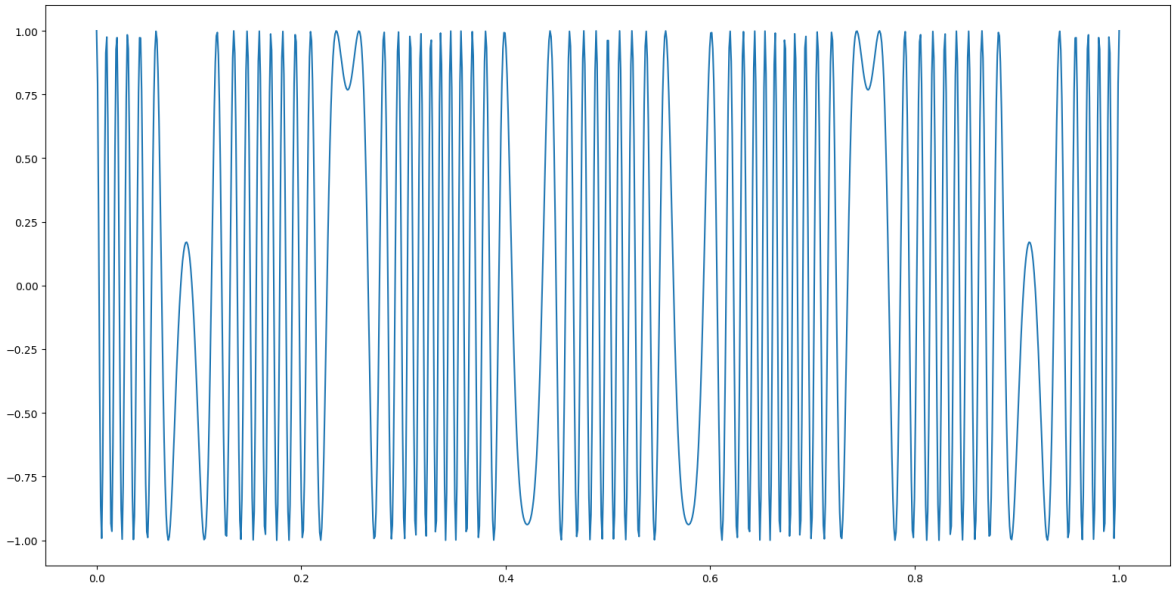



## Zadanie 2

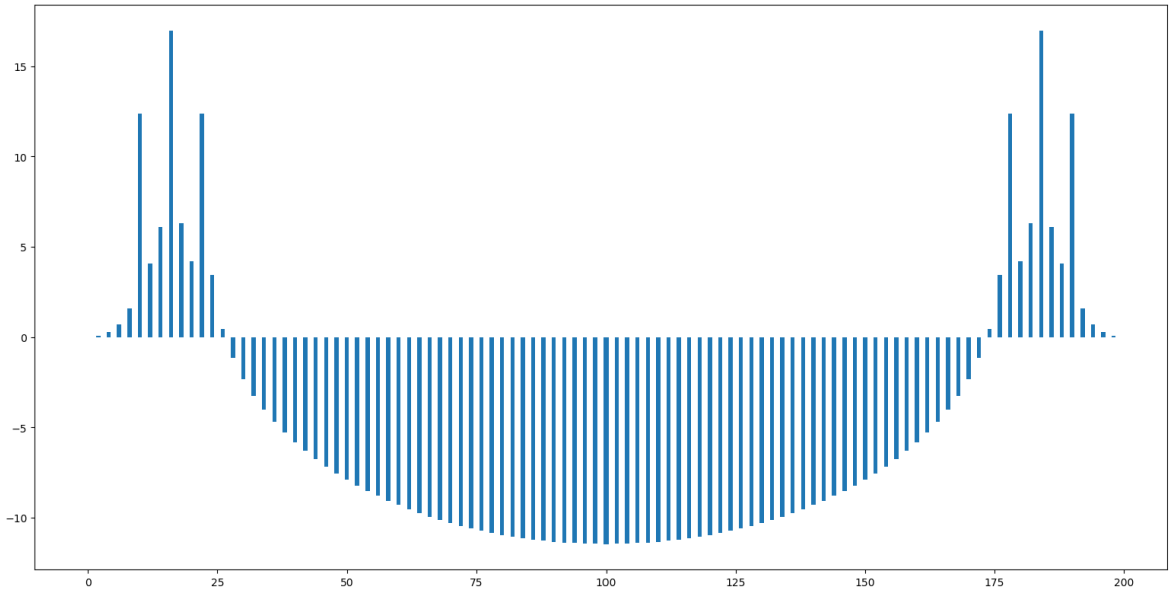
Wykonaj wykresy widm amplitudowych sygnałów zmodulowanych

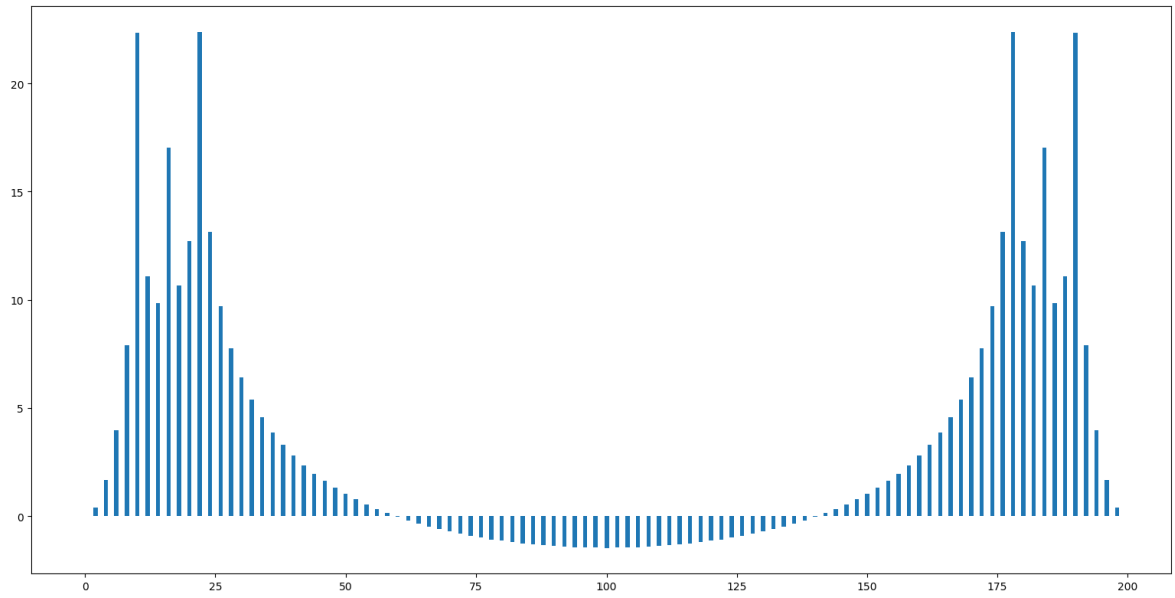

1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0.0
0.2
0.4
0.6
0.8
1.0

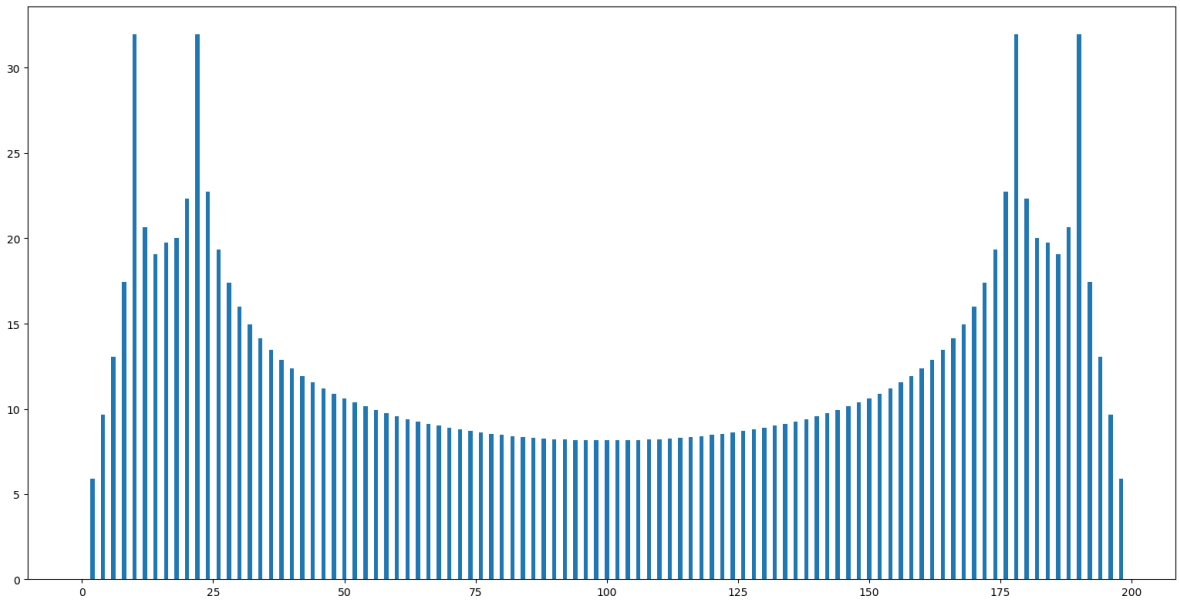

60
40
20
0
−20
−40
−60
0.0
0.2
0.4
0.6
0.8
1.0

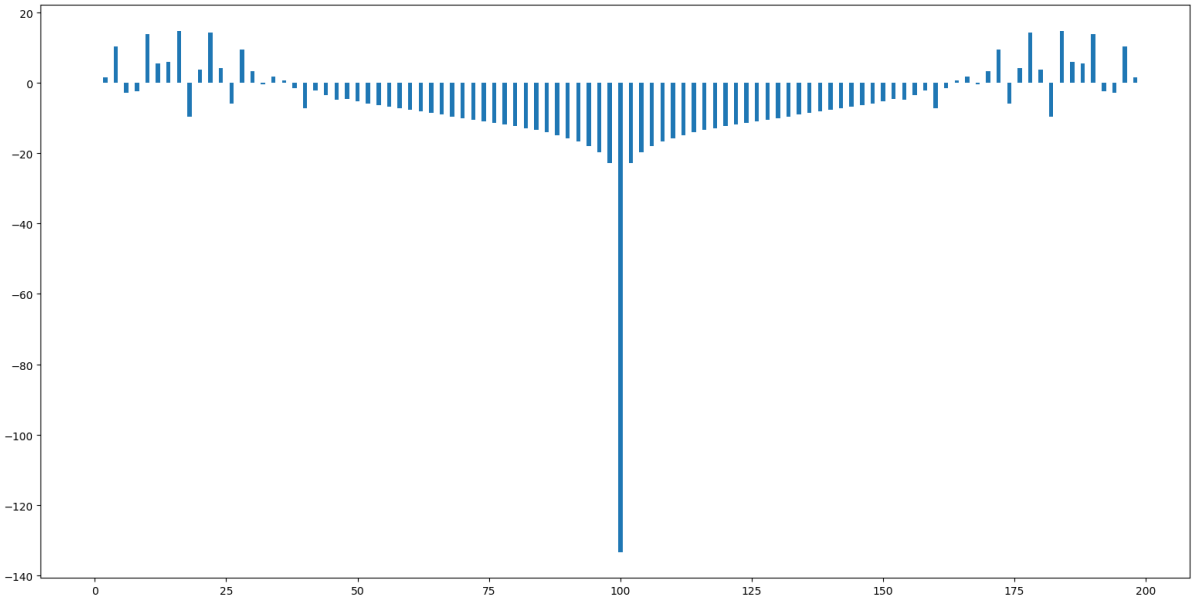



Widma decybelowe




20
15
10
5
0
0
25
50
75
100
125
150
175
200


30
25
20
15
10
5
0
0
25
50
75
100
125
150
175
200


20
0
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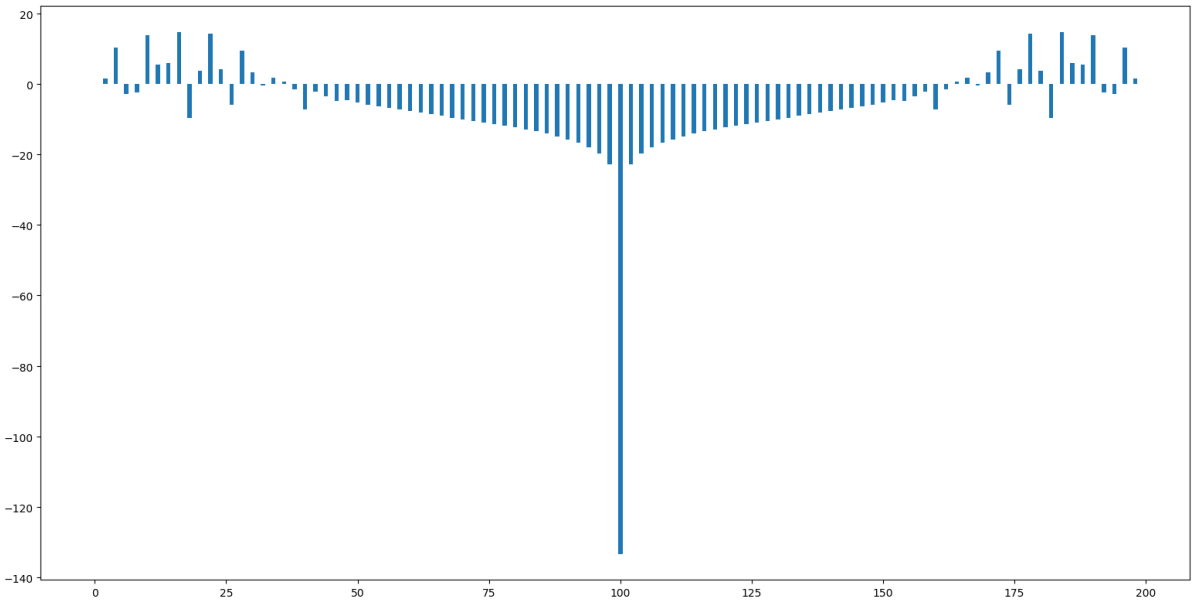
−40
−60
−80
−100
−120
−140
0
25
50
75
100
125
150
175
200


20
0
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−140
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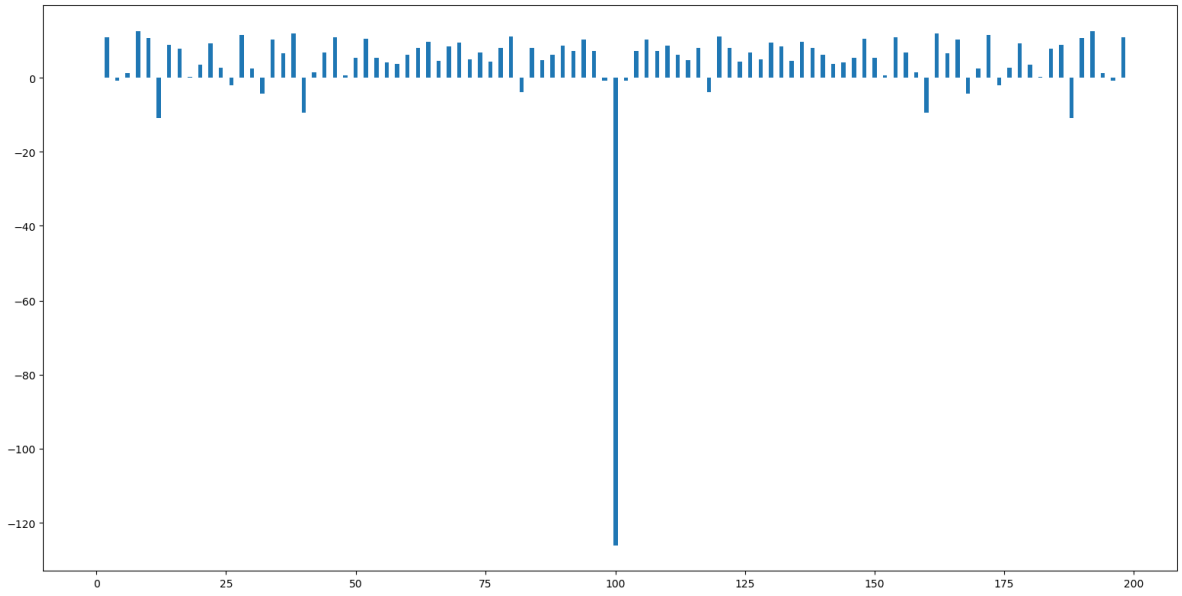
175
200




## Zadanie 3

Zbadaj szerokość pasma sygnałów zmodulowanych

```
k_A = 0.7
mk = widmo(z_A(t, k_A))
mk_p = 10 * np.log10(mk)
pasmo(mk_p)

#28.430241886756765

k_A = 7
mk = widmo(z_A(t, k_A))
mk_p = 10 * np.log10(mk)
pasmo(mk_p)

#23.83422822501708

k_A = 64
mk = widmo(z_A(t, k_A))
mk_p = 10 * np.log10(mk)
pasmo(mk_p)

#31.98105998953324
```