

Przykład rozwiązania zadania z MAAD

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1 Ćwiczenie 1

1.1 Zadanie 1.1

$\sqrt{9+4\sqrt{5}} = \sqrt{4+5+\sqrt{5}} = \sqrt{(2+\sqrt{5})^2} = 2+\sqrt{5} \approx 4.24$, gdzie użyliśmy wzór $(a+b)^2 = a^2 + 2ab + b^2$

[1]: `(9+4*5**0.5)**(1/2)`

[1]: 4.23606797749979

$\left(9^{\frac{1}{4}} + (3\sqrt{3})^{\frac{4}{3}}\right) \left(9^{\frac{1}{4}} - (3\sqrt{3})^{\frac{4}{3}}\right) = \left(9^{\frac{2}{4}} - (3\sqrt{3})^{\frac{8}{3}}\right) = 3 - \sqrt{3}^8 = 3 - 81 = -78$, gdzie użyliśmy wzór $(a+b)(a-b) = a^2 - b^2$

[2]: `((9**(1/4))+(3*3**0.5)**(4/3))*((9**(1/4))-(3*3**0.5)**(4/3))`

[2]: -78.0

$\sqrt[3]{110-29\sqrt{17}} = \sqrt[3]{-17\sqrt{17}-12\sqrt{17}+110} = \sqrt[3]{-17\sqrt{17}-3\cdot 4\sqrt{17}+2^3+3\cdot 2\cdot 17} = \sqrt[3]{(2-\sqrt{17})^3} = 2-\sqrt{17} \approx -2.12$, gdzie użyliśmy wzory $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$. Dlaczego odpowiedź w Python jest inna?

[3]: `(110-29*17**0.5)**(1/3)`

[3]: (1.0615528128088307+1.838663406702548j)

Podobne, $\sqrt[3]{110-29\sqrt{17}} = \sqrt[3]{(\sqrt{17}-2)^3} = \sqrt{17}-2 \approx 2.12$.

[4]: `(29*17**0.5-110)**(1/3)`

[4]: 2.123105625617661

$\left(64^{-\frac{1}{6}} - (2\sqrt{2})^{-\frac{4}{6}}\right) \left(64^{-\frac{1}{6}} + \frac{1}{(2\sqrt{2})^{\frac{4}{6}}}\right) = \left(64^{-\frac{1}{6}} - (2\sqrt{2})^{-\frac{4}{6}}\right) \left(64^{-\frac{1}{6}} + (2\sqrt{2})^{\frac{-4}{6}}\right) = \left(64^{-\frac{2}{6}} - (2\sqrt{2})^{-\frac{8}{6}}\right) = (4^{-1} - (\sqrt{2})^{-4}) = 0$, gdzie użyliśmy wzór $(a+b)(a-b) = a^2 - b^2$

[5]: `(64**(-1/6)-(2*2**0.5)**(-4/6))*(64**(-1/6)+(2*2**0.5)**(-4/6))`

[5]: 0.0

$$\sqrt{5+2\sqrt{6}} - \frac{1}{\sqrt{5+2\sqrt{6}}} = \frac{5+2\sqrt{6}-1}{\sqrt{5+2\sqrt{6}}} = \frac{4+2\sqrt{6}}{\sqrt{\sqrt{2}+\sqrt{3}}^2} = \frac{4+2\sqrt{6}}{\sqrt{2}+\sqrt{3}} = \frac{2\sqrt{2}(\sqrt{2}+\sqrt{3})}{\sqrt{2}+\sqrt{3}} = 2\sqrt{2} \approx 2,82$$

[6]: (5 + 2 * 6**0.5)**0.5 - 1/(5 + 2 * 6**0.5)**0.5

[6]: 2.82842712474619

1.2 Zadanie 1.2

[7]: `import math`

[8]: `25*math.pi`

[8]: 78.53981633974483

[9]: `math.pi**2`

[9]: 9.869604401089358

[10]: `18*math.e + math.pi`

[10]: 52.07066556585261

[11]: `math.e*(math.pi + 2)`

[11]: 13.976297879591657

[12]: `math.e**2`

[12]: 7.3890560989306495

[13]: `math.sqrt(12*math.e)`

[13]: 5.711338016744285

[14]: `math.e -math.pi`

[14]: -0.423310825130748

[15]: `math.pi/math.e**2`

[15]: 0.42516833158763634

[16]: `math.sqrt(2)`

[16]: 1.4142135623730951

```
[17]: math.sqrt(math.pi)
```

```
[17]: 1.7724538509055159
```

1.3 Zadanie 1.3

a) $\sum_{k=1}^{100} k^2 = 338350$

```
[18]: sum([x**2 for x in range(1,101)])
```

```
[18]: 338350
```

b) $\sum_{k=1}^{10} 2^k = 2046$

```
[19]: sum([2**k for k in range(1,11)])
```

```
[19]: 2046
```

c) $\sum_{k=2}^{49} (2k + 1) = 2499$

```
[20]: sum([2*k + 1 for k in range(1,50)])
```

```
[20]: 2499
```

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[ ]:
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