

# ЛАБОРАТОРНА РОБОТА №3

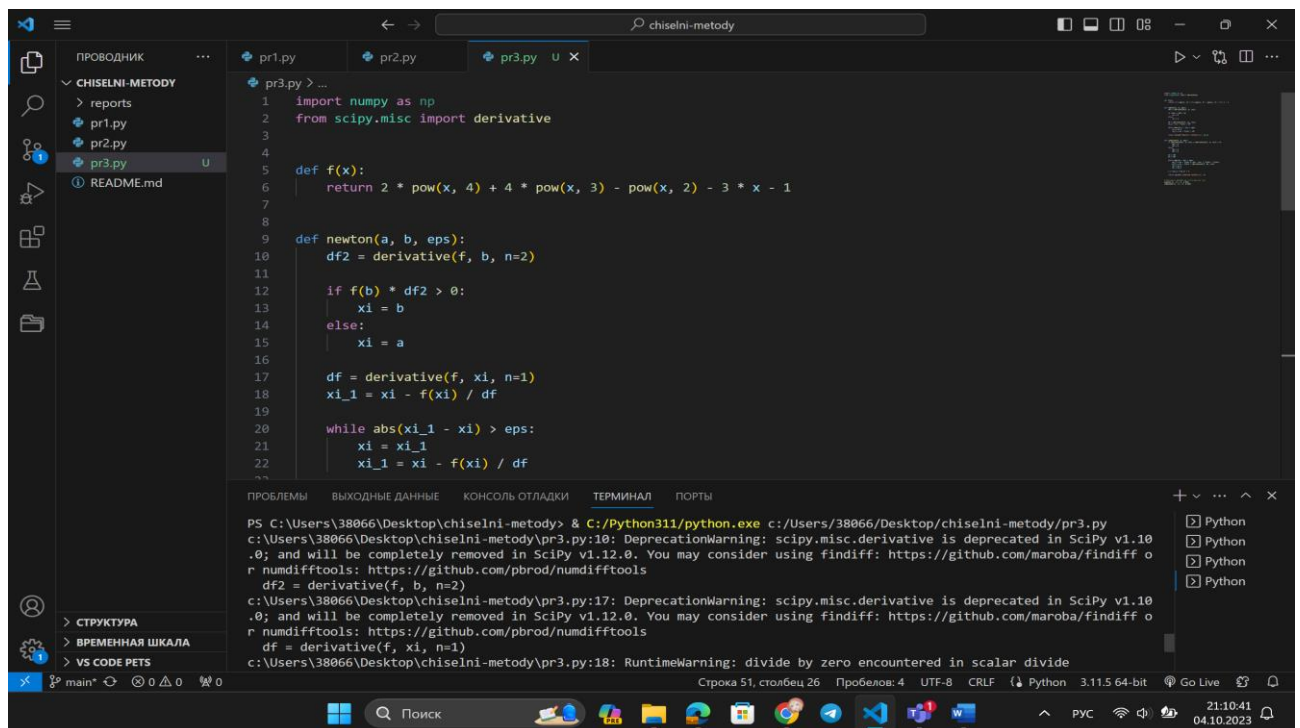
Тема: «Чисельні методи розв'язання нелінійних рівнянь.  
Уточнення кореня нелінійного рівняння»

Трубочанінов Андрій Сергійович

ФІТ 2-8

В-29

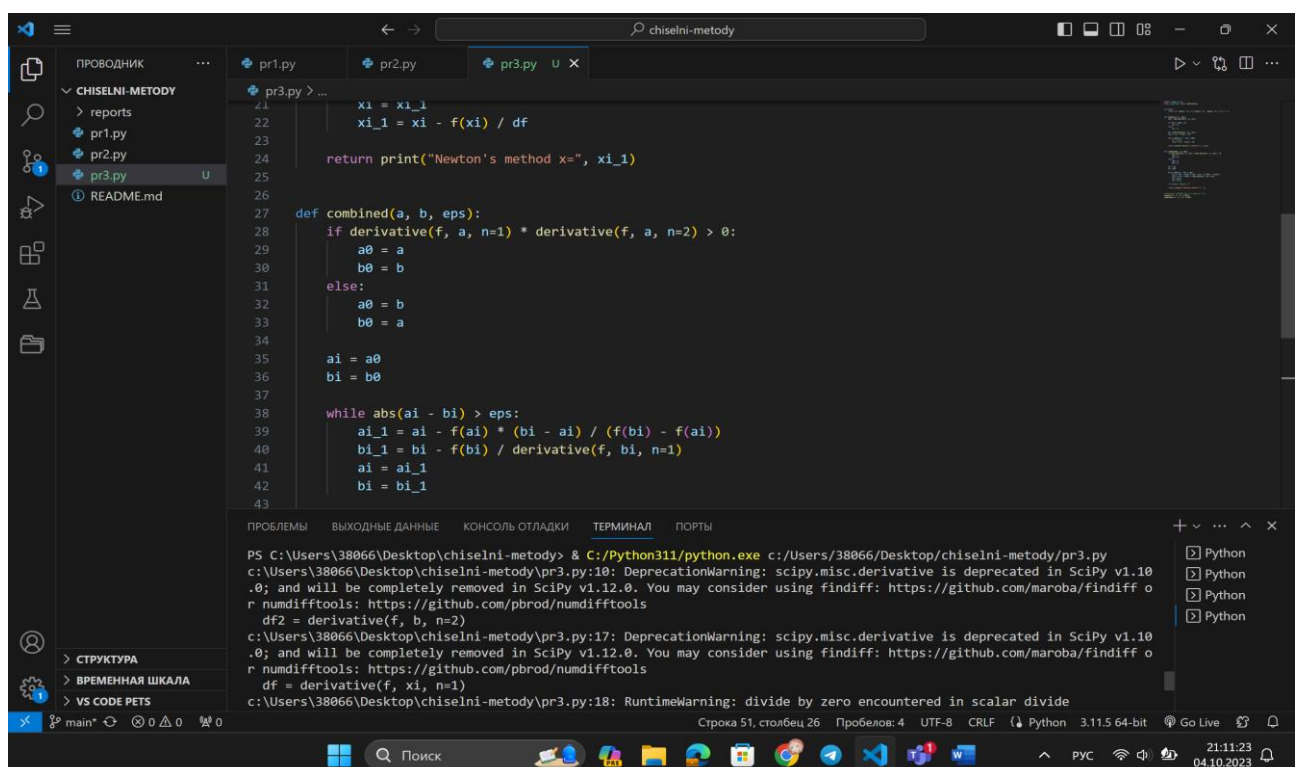
Код:



```
pr3.py > ...
1 import numpy as np
2 from scipy.misc import derivative
3
4
5 def f(x):
6     return 2 * pow(x, 4) + 4 * pow(x, 3) - pow(x, 2) - 3 * x - 1
7
8
9 def newton(a, b, eps):
10     df2 = derivative(f, b, n=2)
11
12     if f(b) * df2 > 0:
13         x1 = b
14     else:
15         x1 = a
16
17     df = derivative(f, x1, n=1)
18     x1_1 = x1 - f(x1) / df
19
20     while abs(x1_1 - x1) > eps:
21         x1 = x1_1
22         x1_1 = x1 - f(x1) / df
23     ...
```

PROBLEMY Выходные данные КОНСОЛЬ ОТЛАДКИ ТЕРМИНАЛ ПОРТЫ

```
PS C:\Users\38066\Desktop\chiselni-metody> & C:/Python311/python.exe c:/Users/38066/Desktop/chiselni-metody/pr3.py
c:\Users\38066\Desktop\chiselni-metody\pr3.py:10: DeprecationWarning: scipy.misc.derivative is deprecated in SciPy v1.10.0; and will be completely removed in SciPy v1.12.0. You may consider using findiff: https://github.com/maroba/findiff or numdifftools: https://github.com/pbrod/numdifftools
  df2 = derivative(f, b, n=2)
c:\Users\38066\Desktop\chiselni-metody\pr3.py:17: DeprecationWarning: scipy.misc.derivative is deprecated in SciPy v1.10.0; and will be completely removed in SciPy v1.12.0. You may consider using findiff: https://github.com/maroba/findiff or numdifftools: https://github.com/pbrod/numdifftools
  df = derivative(f, x1, n=1)
c:\Users\38066\Desktop\chiselni-metody\pr3.py:18: RuntimeWarning: divide by zero encountered in scalar divide
```



```
pr3.py > ...
21 x1 = x1_1
22 x1_1 = x1 - f(x1) / df
23
24 return print("Newton's method x=", x1_1)
25
26
27 def combined(a, b, eps):
28     if derivative(f, a, n=1) * derivative(f, a, n=2) > 0:
29         a0 = a
30         b0 = b
31     else:
32         a0 = b
33         b0 = a
34
35     a1 = a0
36     b1 = b0
37
38     while abs(a1 - b1) > eps:
39         a1_1 = a1 - f(a1) * (b1 - a1) / (f(b1) - f(a1))
40         b1_1 = b1 - f(b1) / derivative(f, b1, n=1)
41         a1 = a1_1
42         b1 = b1_1
43     ...
```

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