Лабораторная №2

Вариант №3

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```python
from lab2 import *
def f(x):
    return (x**4)/4+x**2-8*x+12
def f_x(x):
    return x**3+2*x-8
def f_xx(x):
    return 3*x**2+2
a = 0
b = 2
e = 0.05
func = function(a,b,e,f, f_x, f_xx)
```

```python
bisecting_res = func.bisecting()
bisecting_x = bisecting_res.result[-1][6]
print("Bisecting method: x = ", bisecting_x)
print("f(x) = ", f(bisecting_x))
print()
bisecting_res.print_result()
```

```
Bisecting method: x =  1.63984375
f(x) =  3.3781354529039014

 k | a       | b      | x1     | x2     | f(x1)  | f(x2)  | x
| f(x)  |
------------------------------------------------------------------------
-------------
 1 | 0.0000  | 2.0000 | 0.9750 | 1.0250 | 5.3765 | 5.1266 | 1.0000
| 5.2500  |
 2 | 0.9750  | 2.0000 | 1.4625 | 1.5125 | 3.5826 | 3.4960 | 1.4875
| 3.5366  |
 3 | 1.4625  | 2.0000 | 1.7063 | 1.7563 | 3.3802 | 3.4128 | 1.7313
| 3.3931  |
 4 | 1.4625  | 1.7563 | 1.5844 | 1.6344 | 3.4106 | 3.3800 | 1.6094
| 3.3922  |
 5 | 1.5844  | 1.7563 | 1.6453 | 1.6953 | 3.3766 | 3.3767 | 1.6703
| 3.3734  |
 6 | 1.5844  | 1.6953 | 1.6148 | 1.6648 | 3.3890 | 3.3735 | 1.6398
| 3.3781  |
```

```python
golden_res = func.gold_section()
golden_x = golden_res.result[-1][6]
print("Golden section method: x = ", golden_x)
```

```python
print("f(x) = ", f(golden_x))
print()
golden_res.print_result()
```

```
Golden section method: x =  1.652438064
f(x) =  3.375024992470429
```

k	a	b	x1	x2	f(x1)	f(x2)	x	f(x)
1	0.0000	2.0000	0.7640	1.2360	6.5569	4.2232	1.0000	5.2500
2	0.7640	2.0000	1.2360	1.5278	4.2232	3.4738	1.3820	3.7659
3	1.2360	2.0000	1.5278	1.7082	3.4738	3.3809	1.6180	3.3873
4	1.5278	2.0000	1.7082	1.8196	3.3809	3.4948	1.7639	3.4203
5	1.5278	1.8196	1.6393	1.7082	3.3783	3.3809	1.6737	3.3735
6	1.5278	1.7082	1.5967	1.6393	3.4008	3.3783	1.6180	3.3873
7	1.5967	1.7082	1.6393	1.6656	3.3783	3.3735	1.6524	3.3750

```python
chords_res = func.chord()
chords_x = chords_res.result[-1][-3]
print("Chords method: x = ", chords_x)
print("f(x) = ", f(chords_x))
print()
chords_res.print_result()
```

```
Chords method: x =  1.6691054537094632
f(x) =  3.3733972185530625
```

k	a	b	f'(a)	f'(b)	x	f'(x)	f(x)
1	0.0000	2.0000	-8.0000	4.0000	1.3333	-2.9630	3.9012
2	1.3333	2.0000	-2.9630	4.0000	1.6170	-0.5378	3.3878
3	1.6170	2.0000	-0.5378	4.0000	1.6624	-0.0809	3.3737
4	1.6624	2.0000	-0.0809	4.0000	1.6691	-0.0118	3.3734

```python
newton_res = func.newton()
newton_x = newton_res.result[-1][0]
print("Newton method: x = ", newton_x)
print("f(x) = ", f(newton_x))
print()
newton_res.print_result()
```

```
Newton method: x =  1.6711590296495957
f(x) =  3.373394827694206

k |   x    | f'(x)  | f''(x)  |  f(x)   |
----------------------------------------------
1 | 1.0000 |-5.0000 | 5.0000  | 4.0000  |
2 | 2.0000 | 4.0000 |14.0000  | 3.3836  |
3 | 1.7143 | 0.4665 |10.8163  | 3.3734  |
4 | 1.6712 | 0.0095 |10.3783  | 3.3734  |
```