

Лабораторная №2

Вариант №3

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In [ ]: 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)
```

```
In [ ]: 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

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

```
In [ ]: 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

```
In [ ]: 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