Table 2
Comparison of BMO with CEP, FEP, CES, and FES on benchmark functions f_1–f_7. All results have been averaged over 50 runs.

Function	Index	BMO	CEP	FEP	CES	FES
f_1	Mean	**1.2932e−246**	2.2e−4	5.7e−4	3.4e−5	2.5e−4
	Std.	0	5.9e−4	1.3e−4	8.6e−6	6.8e−4
	Rank	1	3	5	2	4
f_2	Mean	**1.3939e−131**	2.6e−3	8.1e−3	2.1e−2	6.0e−2
	Std.	8.1401e−131	1.7e−4	7.7e−4	2.2e−3	9.6e−3
	Rank	1	2	3	4	5
f_3	Mean	**6.4322e−16**	5.0e−2	1.6e−2	1.3e−4	1.4e−3
	Std.	4.4102e−15	6.6e−2	1.4e−2	8.5e−5	5.3e−4
	Rank	1	5	4	2	3
f_4	Mean	**1.9308e−8**	2.0	0.3	0.35	5.5e−3
	Std.	1.2335e−7	1.2	0.5	0.42	6.5e−4
	Rank	1	5	3	4	2
f_5	Mean	7.5401	6.17	**5.06**	6.69	33.28
	Std.	16.9421	13.61	5.87	14.45	43.13
	Rank	4	2	1	3	5
f_6	Mean	**0**	577.76	**0**	411.16	**0**
	Std.	0	1125.76	0	695.35	0
	Rank	1	5	1	4	1
f_7	Mean	**5.4117e−4**	1.8e−2	7.6e−3	3.0e−2	1.2e−2
	Std.	2.6162e−4	6.4e−3	2.6e−3	1.5e−2	5.8e−3
	Rank	1	4	2	5	3
Average rank		1.43	3.71	2.71	3.43	3.29
Final rank		1	5	2	4	3

Table 5
Comparison of BMO with CEP, FEP, CES, and FES on benchmark functions f_8–f_{13}. All results have been averaged over 50 runs.

Function	Index	BMO	CEP	FEP	CES	FES
f_8	Mean	**−12569.5**	−7917.1	−12554.5	−7549.9	−12556.4
	Std.	2.1761e−5	634.5	52.6	631.39	32.53
	Rank	1	4	3	5	2
f_9	Mean	**9.2371e−16**	89.0	4.6e−2	70.82	0.16
	Std.	4.9768e−15	23.1	1.2e−2	21.49	0.33
	Rank	1	5	2	4	3
f_{10}	Mean	**4.4409e−15**	9.2	1.8e−2	9.07	1.2e−2
	Std.	0	2.8	2.1e−2	2.84	1.8e−3
	Rank	1	5	3	4	2
f_{11}	Mean	**0.0032**	8.6e−2	1.6e−2	0.38	3.7e−2
	Std.	0.0051	0.12	2.2e−2	0.77	5.0e−2
	Rank	1	4	2	5	3
f_{12}	Mean	**1.5705e−32**	1.76	9.2e−6	1.18	2.8e−2
	Std.	5.4738e−48	2.4	6.1395e−5	1.87	8.1e−11
	Rank	1	5	2	4	3
f_{13}	Mean	4.3949e−4	1.4	1.6e−4	1.39	**4.7e−5**
	Std.	0.0022	3.7	7.3e−5	3.33	1.5e−5
	Rank	3	5	2	4	1
Average rank		1.33	4.67	2.33	4.33	2.33
Final rank		1	5	2	4	2

1. Recreate the tables above as one table where only functions f1, f2, f3, f5, f6, f7, f8, and f9 are included.
2. Create 4 new columns for each test of our collected data
    a. Column 1: FA-1
    b. Column 2: FA-2
    c. Column 3: FA-3
    d. Column 4: FA-4
3. Input our collected data into the corresponding region

OUTPUT

```
fly_Optimization/firefly_algo_code.py
Begin testing -->


 Inital test: move_restriction = False, alpha = 0.25


Type Begin
f1 1 / 5
f1 2 / 5
f1 3 / 5
f1 4 / 5
f1 5 / 5
f1 -->  Mean:  8.804607158189983   STD: 20.27430731088028   Expected min:  0
f2 1 / 5
f2 2 / 5
f2 3 / 5
f2 4 / 5
f2 5 / 5
f2 -->  Mean:  0.4026983410215202   STD: 0.3469171387814413   Expected min:  0
f3 1 / 5
f3 2 / 5
f3 3 / 5
f3 4 / 5
f3 5 / 5
f3 -->  Mean:  4.398467896436651   STD: 9.639486744002895   Expected min:  0
f5 1 / 5
f5 2 / 5
f5 3 / 5
f5 4 / 5
f5 5 / 5
f5 -->  Mean:  0.0   STD: 0.0   Expected min:  0
f6 1 / 5
f6 2 / 5
f6 3 / 5
f6 4 / 5
f6 5 / 5
f6 -->  Mean:  5.22   STD: 10.452349018282924   Expected min:  0
f7 1 / 5
f7 2 / 5
```

f7 3 / 5
f7 4 / 5
f7 5 / 5
f7 --> Mean: 0.0009258111019656999 STD: 0.0008579346822992977 Expected min: 0
Type Begin
f8 1 / 5
f8 2 / 5
f8 3 / 5
f8 4 / 5
f8 5 / 5
f8 --> Mean: -405.2042411582503 STD: 18.849481449898363 Expected min: -12569.5
f9 1 / 5
f9 2 / 5
f9 3 / 5
f9 4 / 5
f9 5 / 5
f9 --> Mean: 0.7954406778975947 STD: 0.6630645698884579 Expected min: 0

Second test [Alpha Increased]: move_restriction = False, alpha = 0.50

Type Begin
f1 1 / 5
f1 2 / 5
f1 3 / 5
f1 4 / 5
f1 5 / 5
f1 --> Mean: 4.619742368412366 STD: 10.106013437387189 Expected min: 0
f2 1 / 5
f2 2 / 5
f2 3 / 5
f2 4 / 5
f2 5 / 5
f2 --> Mean: 0.3424607352697079 STD: 0.33227441626899823 Expected min: 0
f3 1 / 5
f3 2 / 5
f3 3 / 5
f3 4 / 5
f3 5 / 5
f3 --> Mean: 5.332849228137406 STD: 8.652767492819825 Expected min: 0
f5 1 / 5
f5 2 / 5
f5 3 / 5

f5 4 / 5
f5 5 / 5
f5 --> Mean: 0.0 STD: 0.0 Expected min: 0
f6 1 / 5
f6 2 / 5
f6 3 / 5
f6 4 / 5
f6 5 / 5
f6 --> Mean: 6.02 STD: 11.289800706832695 Expected min: 0
f7 1 / 5
f7 2 / 5
f7 3 / 5
f7 4 / 5
f7 5 / 5
f7 --> Mean: 0.0009451994342463574 STD: 0.0007203362132429637 Expected min: 0
Type Begin
f8 1 / 5
f8 2 / 5
f8 3 / 5
f8 4 / 5
f8 5 / 5
f8 --> Mean: -398.16843009496256 STD: 35.4144019913257 Expected min: -12569.5
f9 1 / 5
f9 2 / 5
f9 3 / 5
f9 4 / 5
f9 5 / 5
f9 --> Mean: 0.7200558988720727 STD: 0.808784866444068 Expected min: 0

Third test [Alpha Decreased]: move_restriction = True, alpha = 0.10

Type Begin
f1 1 / 5
f1 2 / 5
f1 3 / 5
f1 4 / 5
f1 5 / 5
f1 --> Mean: 5.253634139416854 STD: 7.33252716535573 Expected min: 0
f2 1 / 5
f2 2 / 5
f2 3 / 5
f2 4 / 5
f2 5 / 5

f2 --> Mean: 0.3461227674024942 STD: 0.35190630144014434 Expected min: 0
f3 1 / 5
f3 2 / 5
f3 3 / 5
f3 4 / 5
f3 5 / 5
f3 --> Mean: 4.86082994569671 STD: 9.578980449895367 Expected min: 0
f5 1 / 5
f5 2 / 5
f5 3 / 5
f5 4 / 5
f5 5 / 5
f5 --> Mean: 0.0 STD: 0.0 Expected min: 0
f6 1 / 5
f6 2 / 5
f6 3 / 5
f6 4 / 5
f6 5 / 5
f6 --> Mean: 4.24 STD: 6.0549483895405745 Expected min: 0
f7 1 / 5
f7 2 / 5
f7 3 / 5
f7 4 / 5
f7 5 / 5
f7 --> Mean: 0.0009055386832270415 STD: 0.0007456908160043751 Expected min: 0
Type Begin
f8 1 / 5
f8 2 / 5
f8 3 / 5
f8 4 / 5
f8 5 / 5
f8 --> Mean: -408.0492844172145 STD: 20.79488370078856 Expected min: -12569.5
f9 1 / 5
f9 2 / 5
f9 3 / 5
f9 4 / 5
f9 5 / 5
f9 --> Mean: 0.8549341635951809 STD: 0.8440996261869481 Expected min: 0

Fourth test [Move Restriction True]: move_restriction = True, alpha = 0.25

Type Begin

f1 1 / 5
f1 2 / 5
f1 3 / 5
f1 4 / 5
f1 5 / 5
f1 --> Mean: 4.541067202321007 STD: 8.565334595661803 Expected min: 0
f2 1 / 5
f2 2 / 5
f2 3 / 5
f2 4 / 5
f2 5 / 5
f2 --> Mean: 0.34956109359157755 STD: 0.2958266548577681 Expected min: 0
f3 1 / 5
f3 2 / 5
f3 3 / 5
f3 4 / 5
f3 5 / 5
f3 --> Mean: 7.0194159457769505 STD: 12.791660778043592 Expected min: 0
f5 1 / 5
f5 2 / 5
f5 3 / 5
f5 4 / 5
f5 5 / 5
f5 --> Mean: 0.0 STD: 0.0 Expected min: 0
f6 1 / 5
f6 2 / 5
f6 3 / 5
f6 4 / 5
f6 5 / 5
f6 --> Mean: 4.34 STD: 6.7278822819665915 Expected min: 0
f7 1 / 5
f7 2 / 5
f7 3 / 5
f7 4 / 5
f7 5 / 5
f7 --> Mean: 0.0009893942366814815 STD: 0.0007679200866013155 Expected min: 0
Type Begin
f8 1 / 5
f8 2 / 5
f8 3 / 5
f8 4 / 5
f8 5 / 5
f8 --> Mean: -408.5167461332259 STD: 15.191733676849683 Expected min: -12569.5
f9 1 / 5

f9 2 / 5
f9 3 / 5
f9 4 / 5
f9 5 / 5
f9 --> Mean: 0.7186045809773287 STD: 0.5376510050965286 Expected min: 0