

```
1 import math
2 import random
3 from math import sin
4
5 def f1(x):
6     return -x**2
7
8 def f2(x):
9     return sin(x)
10
11 def f3(x):
12     return -(5*x**2) + (3*x) + 2
13
14 def best_neighbour(f, x, step=0.1):
15     if f(x - step) > f(x):
16         return x - step
17     elif f(x + step) > f(x):
18         return x + step
19     else:
20         return x
21
22 def hill_climbing(f, x, max_iterations=1000):
23     for _ in range(max_iterations):
24         neighbour = best_neighbour(f, x)
25         if f(neighbour) > f(x):
26             x = neighbour
27         else:
28             break
29     return x
30
31 def main():
32     ranges = [(-1, 1), (-math.pi, math.pi), (-100,
33     100)]
34     functions = [f1, f2, f3]
35     for i, f in enumerate(functions):
36         x = random.uniform(*ranges[i])
37         best_position = hill_climbing(f, x)
38         print(f"For function {i+1}, the best position
39         found is {best_position} with a value of {f(
40         best_position)}.")
```

```
39 if __name__ == "__main__":  
40     main()
```