1: The First Problem

(a) Algorithm:

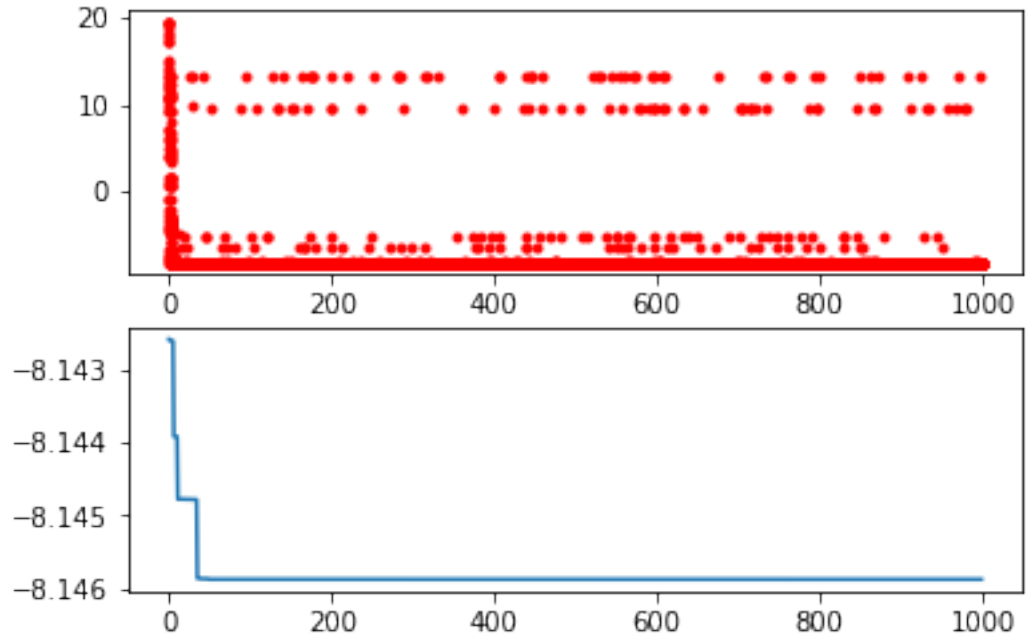
```
import numpy as np
from sko.GA import GA
import pandas as pd
import matplotlib.pyplot as plt

def schaffer(p):
    x, = p
    return x + 10 * np.sin(x) + 7 * np.cos(x)

ga = GA(func=schaffer, n_dim=1, size_pop=50, max_iter=1000, lb=[0], ub=[10], precis
best_x, best_y= ga.run()

Y_history = pd.DataFrame(ga.all_history_Y)
fig, ax = plt.subplots(2, 1)
ax[0].plot(Y_history.index, Y_history.values, '.', color='red')
Y_history.min(axis=1).cummin().plot(kind='line')
plt.show()
```

(b) Output:



2: The Second Problem

(a) Algorithm:

```
import numpy as np
from sko.GA import GA
import pandas as pd
import math
import matplotlib.pyplot as plt

def schaffer(p):
    x,y = p
    return y * np.sin(2*math.pi * x) + x * np.cos(2 * math.pi * y)

ga = GA(func=schaffer, n_dim=2, size_pop=50, max_iter=1000, lb=[-2,-2], ub=[2,2],
best_x, best_y= ga.run()

Y_history = pd.DataFrame(ga.all_history_Y)
fig, ax = plt.subplots(2, 1)
ax[0].plot(Y_history.index, Y_history.values, '.', color='red')
Y_history.min(axis=1).cummin().plot(kind='line')
plt.show()
```

(b) Output: