

```

1  #!/usr/bin/env python3
2  # -*- coding: utf-8 -*-
3  """
4  Created on Wed Sep 29 10:20:41 2021
5
6  @author: bdobkowski
7  """
8  import numpy as np
9  from scipy.optimize import minimize
10 import scipy.integrate as integrate
11 from matplotlib import pyplot as plt
12
13 # 1. define a sine function using numpy
14 def myFcn(t):
15     return np.sin(t)
16
17 # 2. find minimum of the function using scipy
18 x0 = np.array([-0.5])
19 minimum = minimize(myFcn, x0)
20 print('Minimum:')
21 print(minimum)
22
23 # 3. integrate the function from 0 to 1 using scipy
24 integral, err = integrate.quad(myFcn, 0, 1)
25 print('Integral:')
26 print(integral)
27
28 # 4. plot the function using Matplotlib from [0, 2pi]
29 t = np.arange(0, 2*np.pi, 0.001)
30 fig, ax = plt.subplots()
31 ax.plot(t, myFcn(t))
32 ax.set_title('sin(t) over [0, 2*pi]')
33 ax.set_xlabel('t')
34 ax.set_ylabel('sin(t)')
35 fig.savefig('my_sin_fig')
36

```

Code Output:

```
Minimum:
  fun: -0.9999999999999932
 hess_inv: array([[1.00045887]])
   jac: array([-1.04308128e-07])
message: 'Optimization terminated successfully.'
  nfev: 10
   nit: 4
  njev: 5
status: 0
success: True
      x: array([-1.57079644])
Integral:
0.45969769413186023
```

