

```
1: #!/usr/bin/python3
2:
3: from pylab import *
4: from numpy import *
5:
6: from pprint import pprint
7:
8: def simpson(func, a, b, h=0.1):
9:     """Approximates integral using simpson method"""
10:    n = int(abs(b - a) / h)
11:    n -= 1 if n % 2 == 1 else 0
12:    I1 = (h / 3.0) * (
13:        func(a) + func(b) +
14:        (4.0 * sum([func(a + (k * h)) for k in range(1, n, 2)])) +
15:        (2.0 * sum([func(a + (k * h)) for k in range(2, n - 1, 2)]))
16:    )
17:    h2 = 2 * h
18:    n2 = int(abs(b - a) / h2)
19:    n2 -= 1 if n2 % 2 == 1 else 0
20:    I2 = (h2 / 3.0) * (
21:        func(a) + func(b) +
22:        (4.0 * sum([func(a + (k * h2)) for k in range(1, n2, 2)])) +
23:        (2.0 * sum([func(a + (k * h2)) for k in range(2, n2 - 1, 2)]))
24:    )
25:    return (I1, abs(I1 - I2) / 3)
26:
27: def load_data():
28:     data = loadtxt('data1.txt')
29:     return data[0], data[1], data[3], data[5]
30:
31: T_plot, E1, E2, E3 = load_data()
32: T_plot = [round(x, 10) for x in list(T_plot)]
33:
34: def RMI(T, T_max):
35:     return simpson(lambda x: (2*E1[T_plot.index(round(x,10))]-E2[T_plot.index(round(x,10))]-2*E3[T_plot.index(round(x, 10))]) / x**2, T, T_max)
36:
37: def p3():
38:     T_max = T_plot[-1]
39:     def a():
40:         print(RMI(float(input("T[{}-{}]: ".format(T_plot[0], T_plot[-1]))), T_max))
41:         # pprint([round(x, 5) for x in list(T)])
42:         plot(T_plot, [RMI(x, T_max)[0] for x in T_plot], label="RMI")
43:         xlabel('Temperature (K)')
44:         ylabel('RMI(T)')
45:         xlim(0, 100)
46:         legend()
47:         show()
48:
49:     a()
50:
51: if __name__ == "__main__":
52:     p3()
```