```
    1: #!/usr/bin/python3
    2:
    3: from pylab import *
    4: from numpy import *
    5:
    6: from pprint import pprint
    7:
    8:
    9: def simpson(func, a, b, h=0.1):
   10:     """Approximates integral using simpson method"""
   11:     n = int(abs(b - a) / h)
   12:     n -= 1 if n % 2 == 1 else 0
   13:     I1 = (h / 3.0) * (
   14:         func(a) + func(b) +
   15:         (4.0 * sum([func(a + (k * h)) for k in range(1, n, 2)])) +
   16:         (2.0 * sum([func(a + (k * h)) for k in range(2, n - 1, 2)])))
   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:     return (I1, abs(I1 - I2) / 3)
   25:
   26:
   27: def load_data():
   28:     data = loadtxt('data1.txt')
   29:     return data[0], data[1], data[3], data[5]
   30:
   31:
   32: T_plot, E1, E2, E3 = load_data()
   33: T_plot = [round(x, 10) for x in list(T_plot)]
   34:
   35:
   36: def RMI(T, T_max):
   37:     return simpson(lambda x: (2*E1[T_plot.index(round(x,10))]-E2[T_plot.index(round(x,1
0))]-2*E3[T_plot.index(round(x, 10))]) / x**2, T, T_max)
   38:
   39:
   40: def p3():
   41:     T_max = T_plot[-1]
   42:
   43:     def a():
   44:         print(
   45:             RMI(
   46:                 float(input("T[{}-{}]: ".format(T_plot[0], T_plot[-1]))),
   47:                 T_max))
   48:         # pprint([round(x, 5) for x in list(T)])
   49:         plot(T_plot, [RMI(x, T_max)[0] for x in T_plot], label="RMI")
   50:         xlabel('Temperature (K)')
   51:         ylabel('RMI(T)')
   52:         xlim(0, 100)
   53:         legend()
   54:         show()
   55:
   56:     a()
   57:     print("Error ~10^-4")
   58:     print(
   59:         "I would suggest using the fastest method(Trapazoidal) because the error caused
 by the data will always be greater than the error caused by any of the integration methods"
   60:     )
   61:
```

```
62:
63: if __name__ == "__main__":
64:     p3()
```