Lab-09

1. Write a program based on gradient descent to find the minima of a multivariable function. (You can implement a very rudimentry implementation.)

2. Use the above program to find the minima of the Rosenbrock function $f(x, y) = (1 - x)^2 + 100(y - x^2)^2$.

3. Given below is the data from an experiment on black body radiation (many of you have done this experiment), which gives the variation of radiation intensity emitted by a black body as a function of wavelength at T = 1845 K:

   $\lambda =$ [0.7029, 0.7406, 0.8410, 0.9289, 1.0042, 1.2803, 1.4059, 1.6444, 1.8577, 2.2092, 2.5105, 2.7992, 2.9121 3.2762, 4.1297, 4.5314, 4.9958, 5.5607, 5.8243]

   I(λ) = [41.1540, 49.5515, 65.5448, 78.3389, 95.5339, 130.7155, 137.5071, 135.8912, 125.8770, 108.2536, 91.0335, 75.4142, 57.4067, 49.7824, 28.9255, 23.6987, 16.0678, 13.2301, 11.2126]

   λ is given in units of micro meters and intensity is in some arbitrary scale. Given that Planck distribution for black body radiation has the form:

   $I(\lambda) = \frac{A}{\lambda^5\left(Exp(\frac{hc}{K_B T\lambda})-1\right)}$.

   Use a two parameter nonlinear curve fitting to determine the Planck's constant from the above data. ($K_B = 1.38 \times 10^{-23} J/K$and $c = 3 \times 10^8 m/s$).