Assignments on Scipy

1. Solve the given linear programming problem

$$\begin{gathered} Max\ Z = 5x_1 - 2x_2 + 3x_3 \\ \text{Subject to, } 2x_1 + 2x_2 - x_3 \geq 2 \\ 3x_1 - 4x_2 \leq 3 \\ x_2 + 3x_3 \leq 5 \\ x_1, x_2, x_3 \geq 0 \end{gathered}$$

Now, suppose the right hand side constant of first and second constraints are varried in the interval $[2, 15]$ and $[3, 20]$ respectively. Make a $3-d$ plot to observe the change of the objective function value.

2. *Ackley function* is defined as

$$f(x, y) = -20e^{-0.2\sqrt{0.5(x^2+y^2)}} - e^{0.5(cos(2\pi x)+cos(2\pi y))} + e + 20$$

where e is the irrational number having value in between 2.71 and 2.72. Plot the function. Use Broyden-Fletcher-Goldfarb-Shanno (BFGS) method and Nelder-Mead simplex method for obtaining global minima. Locate both the minimum points in the plot. Which method is more accurate?
[Hint: Search for scipy.optimize]

3. Given a set of points in eucledian plane, *convex hull* is defined as the smallest area convex polygon that encompasses all the points. Create n number of $2-d$ points as n by 2 matrix and show its convex hull.
[Hint: Search for scipy.spatial]