Assignment 4

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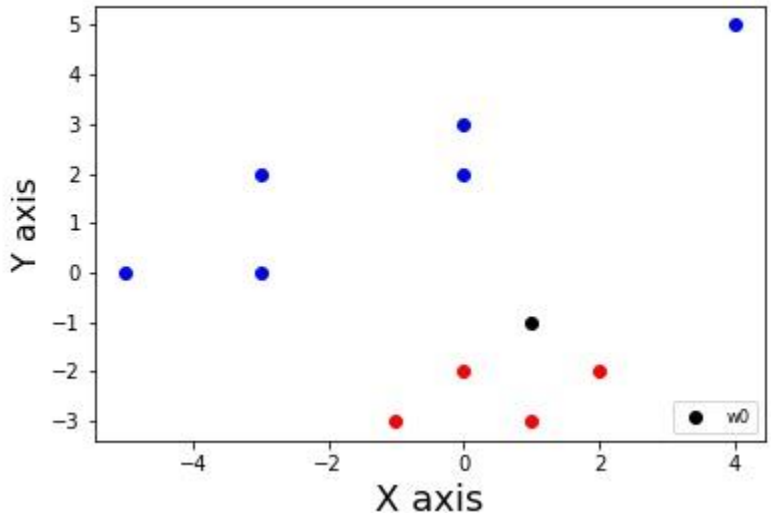
Note : I have only does those parts here that require plots. The rest have been done as handwritten solutions

Q1.

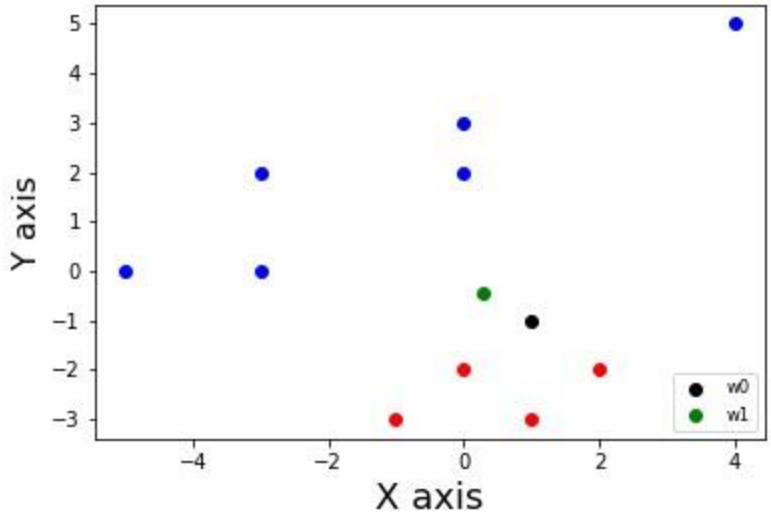
A) The initial working set is W0 = {4}. Given below is the plot of data points



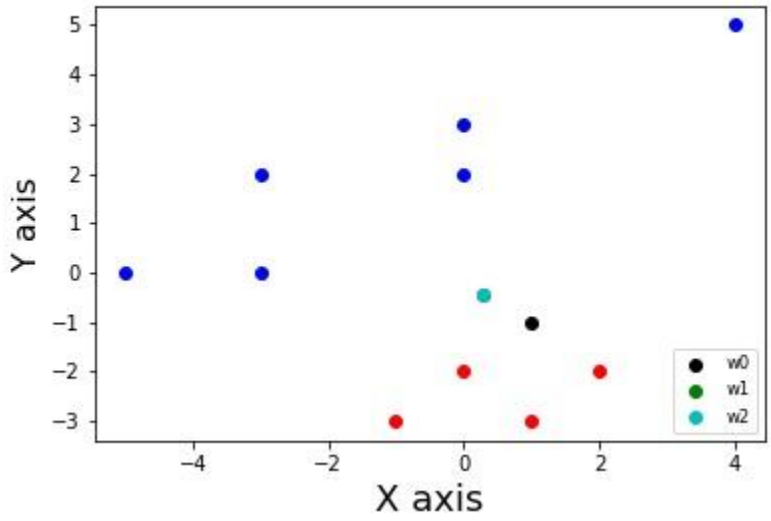
b) The working set after 1st iteration is W1 = {1,4}. The next iterate after 1st iteration is w1 =

`[0.28571,-0.42857]. The feasible direction obtained after minimization with respect to d is [-1.09756, 0.87805]`

`The corresponding Lagrange multiplier is = -0.02439`



C)



The working set after 2nd iteration is W2 = {1,4}. The next iterate after 2nd iteration is w1 =

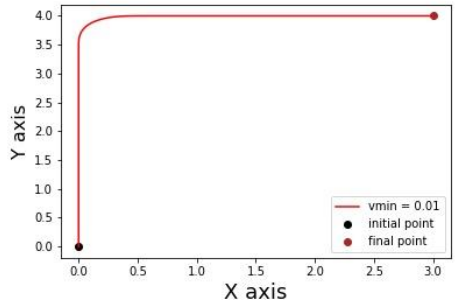
[0.28571,-0.42857]. The feasible direction obtained after minimization with respect to d is [-1.09756, 0.87805]

The corresponding Lagrange multiplier is = -0.02439. Since w1 is the same as w0 therefore they only w2 is visible on the plot.

3 a)

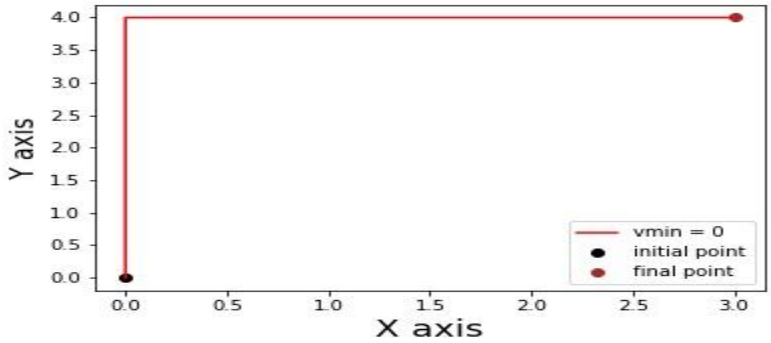
Case 1) theta f = 0, vmin = 0.01

v[1], v[2] = 1.716, v[100] = 2.422 and the rest v[I] = 0.01 for I !={1,2,100}.The plot of trajectory is given below.



Case 2) theta f = 0, vmin = 0

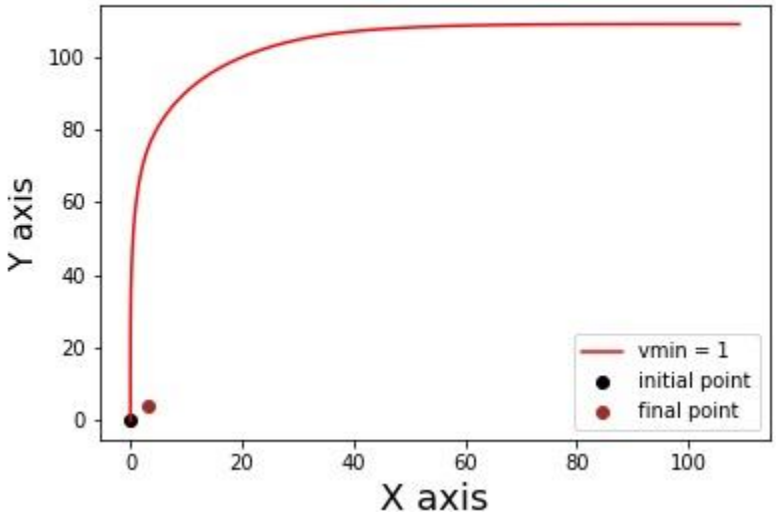
v[1], v[2] = 2, v[100] = 3 and the rest v[I] = 0 for I !={1,2,100}.The plot of trajectory is given below.



Case 3) theta f = 0, vmin = 1

The plot of trajectory is given below.

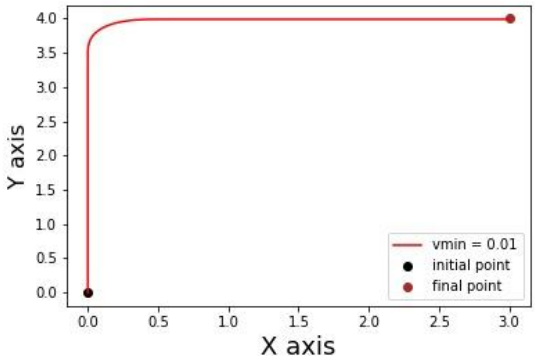
The solution does not converge hence trajectory goes beyond final point



3 a)

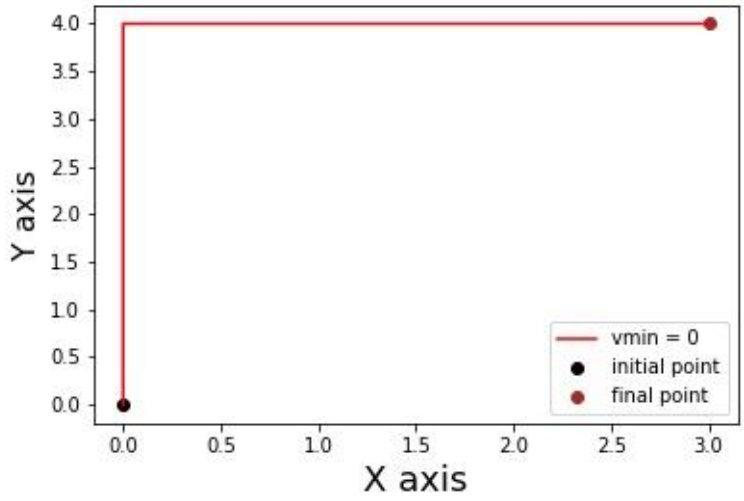
Case 1) theta f = 90 degree, vmin = 0.01

v[1], v[2] = 1.711, v[99] = 2.432 and the rest v[I] = 0.01 for I !={1,2,99}.The plot of trajectory is given below.



Case 2) theta f = 90 degree, vmin = 0

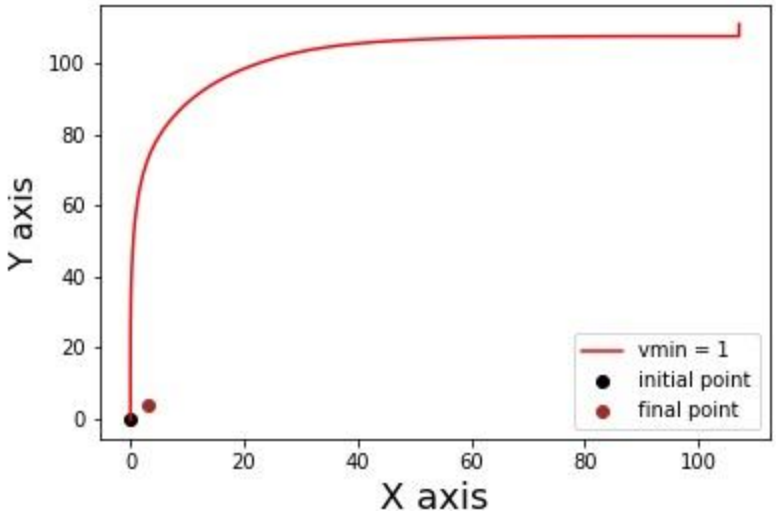
v[1], v[2] = 2, v[99] = 3 and the rest v[I] = 0 for I !={1,2,99}.The plot of trajectory is given below.



Case 3) theta f = 90 degree, vmin = 1

The plot of trajectory is given below.

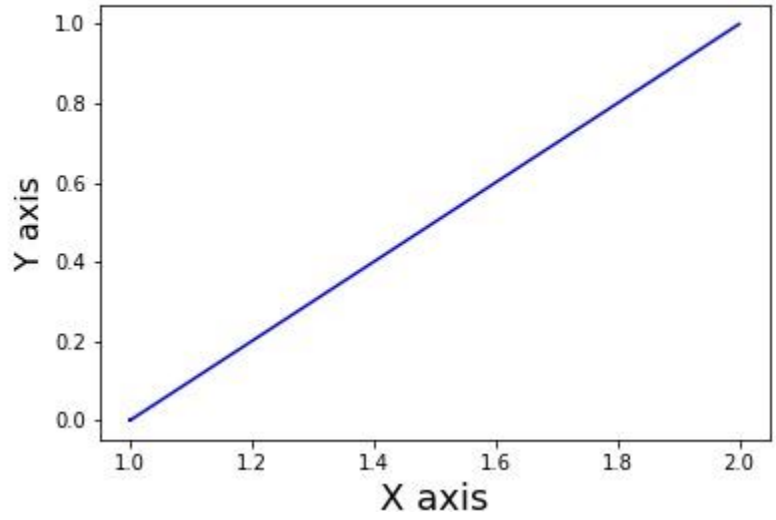
The solution does not converge hence trajectory goes beyond final point



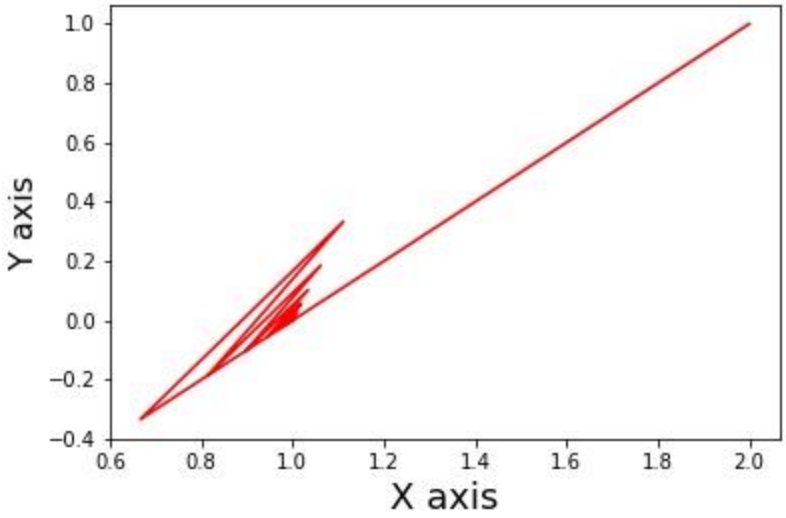
5 c) The optimal projection point obtained after 100 iterations is [3,0.5,0.5]

d) The final projected point obtained is [1,0].This is the trajectory obtained. The red trajectory is for step size = 2/L and the blue trajectory is

For step size = 1/L



For step size = 2/L trajectory is -



From the plots we can that with step size = 2/L the trajectory follows a zig zag path hence takes more iterations to converge.Therefore stepsize 1/L is better.