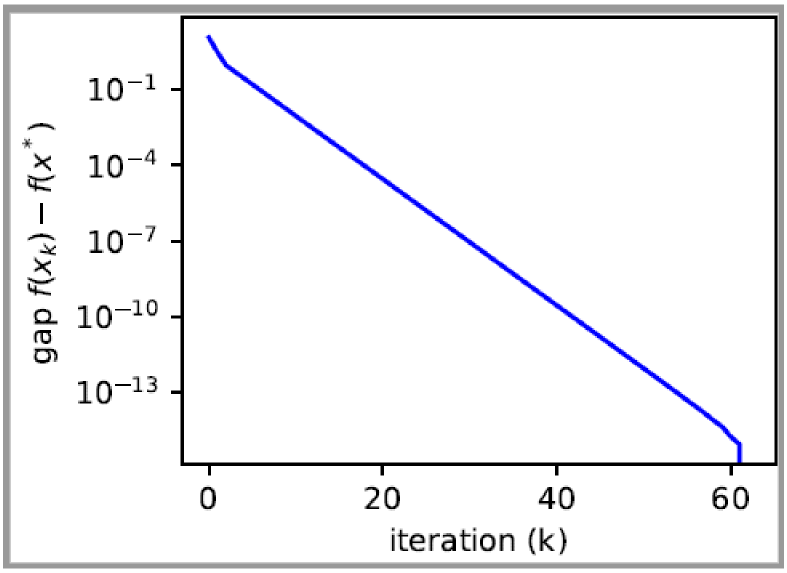
HW11

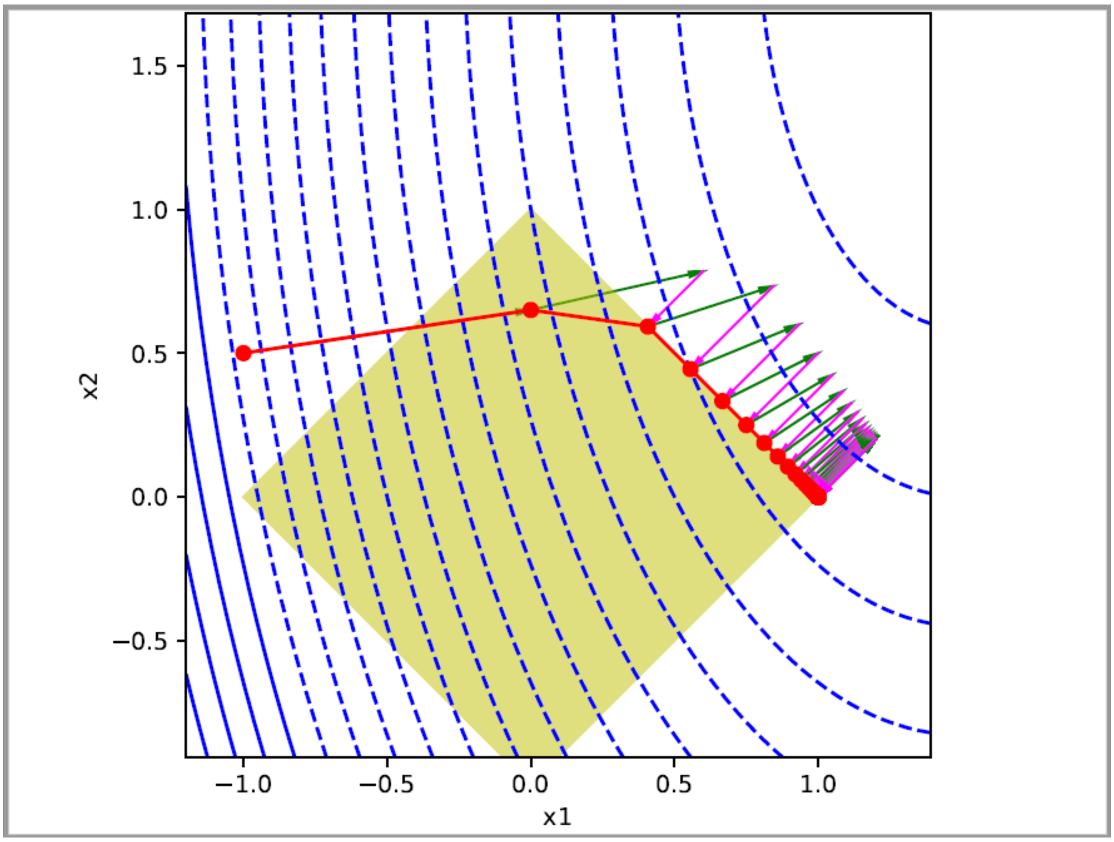
1.

Output of the python code:

```
t =  1
number of iterations: 62
solution: [9.99999981e-01 1.88957511e-08]
value: 4.500000000000001
```

Figures:





2.

(a)

Lagrangian**:**

$$L(x^*,\lambda^*) = e^{x_1^*} + e^{2x_2^*} + e^{2x_3^*} + \lambda^*(x_1^* + x_2^* + x_3^* - 1)$$

The Lagrange condition is9

$$\frac{\partial L}{\partial x} = \begin{matrix} e^{x_1^*} + \lambda^* \\ 2e^{2x_2^*} + \lambda^* \\ 2e^{2x_3^*} + \lambda^* \end{matrix} = \begin{matrix} 0 \\ 0 \\ 0 \end{matrix}$$

$$\frac{\partial L}{\partial \lambda} = x_1^* + x_2^* + x_3^* - 1 = 0$$

Solve the equations. So, the optimal value is

$$x = \left(\frac{1 + ln2}{2}, \frac{1 - ln2}{4}, \frac{1 - ln2}{4}\right).$$

The Lagrange multiplier is

$$\lambda^* = -e^{\frac{1+ln2}{2}}.$$

(b)

The output of the python code:

```
number of iterations: 47
solution: [[0.84657357 0.07671321 0.07671321]]
value: 4.663287963194249
```