

Assignment No.7

Valli Devi Bolla

Download all python codes from

<https://github.com/Vallidevibolla/Assignment-7/blob/main/code.py>

and latex-tikz codes from

<https://github.com/Vallidevibolla/Assignment-7/blob/main/main.tex>

Question taken from

https://github.com/gadepall/ncert/blob/main/linalg/optimization/gvv_ncert_opt.pdf–Q.no.2.11

1 QUESTION 2.11

Maximise

$$Z = x + y \quad (1.0.1)$$

subject to

$$x - y \leq -1 \quad (1.0.2)$$

$$x + y \leq 0 \quad (1.0.3)$$

$$x \geq 0, y \geq 0 \quad (1.0.4)$$

2 SOLUTION

Using (1.0.2) and (1.0.1) perform Langrangian multiplier method

$$f(x) = \lambda g(x) \quad (2.0.1)$$

$$f(x) = 1, g(x) = 1 \quad (2.0.2)$$

$$f(y) = 1, g(y) = -1 \quad (2.0.3)$$

Substituting the values in (2.0.10), we get

$$\mathbf{x} = \lambda \quad (2.0.4)$$

$$\mathbf{y} = -\lambda \quad (2.0.5)$$

Using the constraint (1.0.2)

$$\frac{x}{y} = \frac{\lambda}{-\lambda} \quad (2.0.6)$$

$$\Rightarrow \mathbf{x} = -y \quad (2.0.7)$$

By substituting x value in (1.0.2), we get y value

$$\mathbf{y} = \frac{1}{2} \quad (2.0.8)$$

Then the value of λ is given as

$$\lambda = \mathbf{x} \Rightarrow \lambda = \frac{-1}{2} \quad (2.0.9)$$

Similarly using (1.0.1) and (1.0.3)

$$f(x) = \lambda g(x) \quad (2.0.10)$$

$$f(x) = 1, g(x) = -1 \quad (2.0.11)$$

$$f(y) = 1, g(y) = 1 \quad (2.0.12)$$

Substituting the values in (2.0.10), we get

$$\mathbf{x} = -\lambda \quad (2.0.13)$$

$$\mathbf{y} = \lambda \quad (2.0.14)$$

Finally we get Z=0 with

$$\mathbf{x} = \frac{-1}{2} \quad (2.0.15)$$

$$\mathbf{y} = \frac{1}{2} \quad (2.0.16)$$

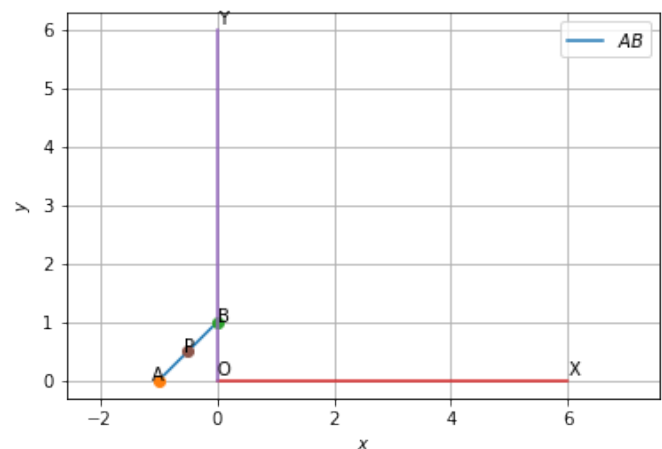


Fig. 0: Graphical solution