Question:

Over all real numbers, find the minimum value of a positive real number, y such that

y =$\sqrt{(x+6)^2+25} \; + \sqrt{(x-6)^2+121}$

Answer:

y =$\sqrt{(x+6)^2+25} \; + \sqrt{(x-6)^2+121}$

differentiating the equation, to get the minimum input

$$dy/dx \; = \; d/dx \, (\sqrt{((x+6)^2+25)} \; + \sqrt{((x-6)^2+121)}$$

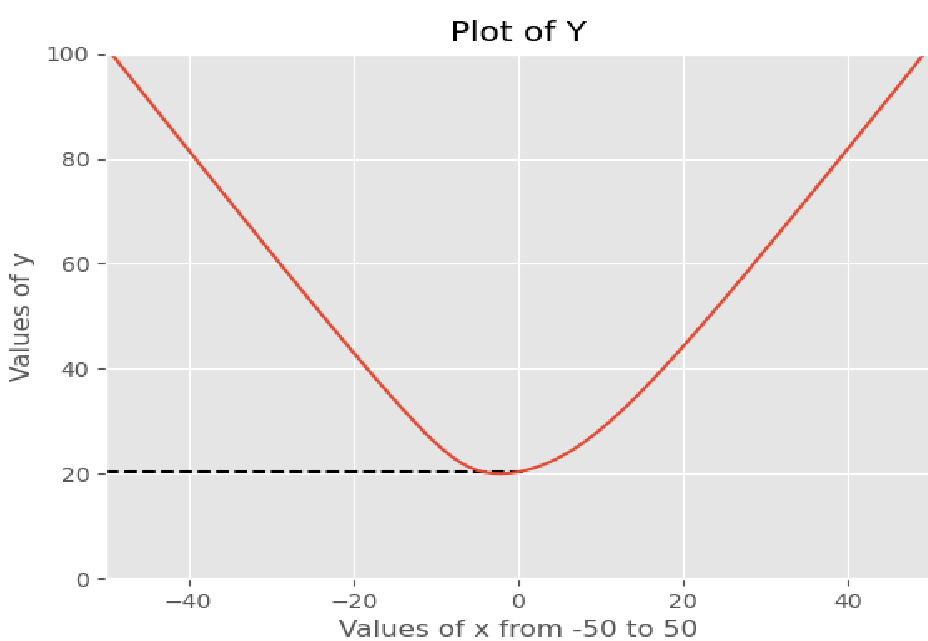
$$\frac{dy}{dx} = \frac{x+6}{\sqrt{(x+6)^2+25}} + \frac{x-6}{\sqrt{(x-6)^2+121}} = 0$$

Minimum value of y is.

$$y = \sqrt{(6)^2+25} \; + \sqrt{(-6)^2+121}$$

$$y = \sqrt{61} \; + \sqrt{157}$$

$$y = 20.34$$



As shown in the above plot.