

# Parallel Lines

## 11<sup>th</sup> Maths - Chapter 10

This is Problem-6 from Exercise 10.3

1. Find the distance between parallel lines

(i)  $15x+8y-34=0$  and  $15x+8y+31=0$

(ii)  $l(x+y)+p=0$  and  $l(x+y)-r=0$

2. solution for problem 1

Given line is

$$15x + 8y - 34 = 0 \text{ and } 15x + 8y + 31 = 0 \quad (1)$$

this equation can be expressed as

$$\mathbf{n}^\top \mathbf{x} = c \quad (2)$$

$$\text{where } \mathbf{n} = \begin{pmatrix} 15 \\ 8 \end{pmatrix} = -34 \quad (3)$$

$$\mathbf{n} = \begin{pmatrix} 15 \\ 8 \end{pmatrix} = 31 \quad (4)$$

distance between parallel lines

$$\mathbf{d} = \frac{|c_1 - c_2|}{\|\mathbf{n}\|} \quad (5)$$

$$\mathbf{d} = \frac{|-34 - 31|}{\sqrt{289}} \quad (6)$$

$$\mathbf{d} = \frac{65}{17} \quad (7)$$

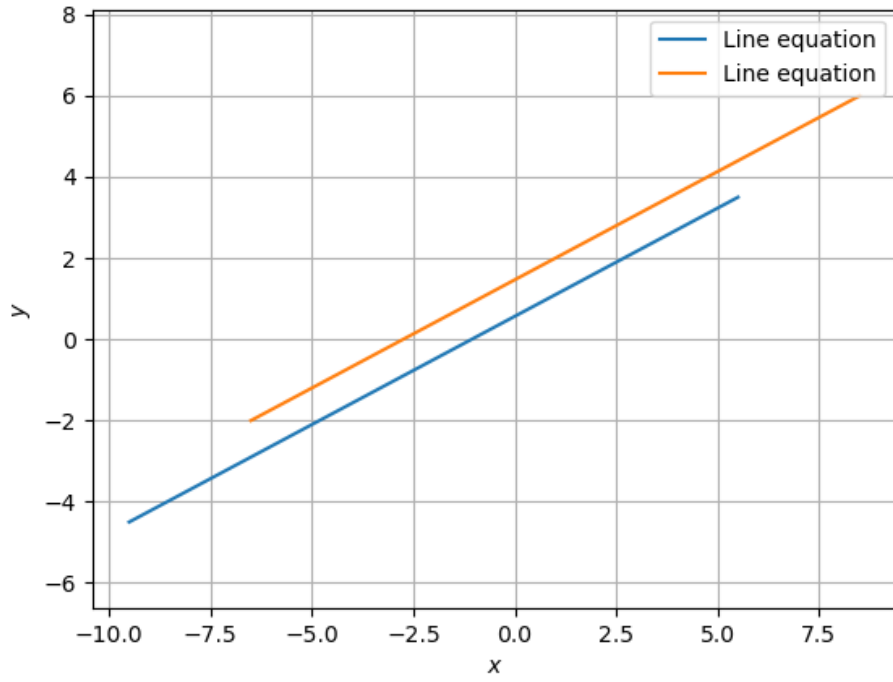


Figure 1

3. solution for problem 2

Given line is

$$l(x + y) + p = 0 \text{ and } l(x + y) - r = 0 \quad (8)$$

this equation can be expressed as

$$\mathbf{n}^\top \mathbf{x} = c \quad (9)$$

$$\text{where } \mathbf{n} = \begin{pmatrix} l \\ l \end{pmatrix} = p \quad (10)$$

$$\mathbf{n} = \begin{pmatrix} l \\ l \end{pmatrix} = -r \quad (11)$$

distance between parallel lines

$$d = \frac{|p - (-r)|}{\sqrt{2l^2}} \quad (12)$$

$$d = \frac{|p + r|}{l\sqrt{2}} \quad (13)$$

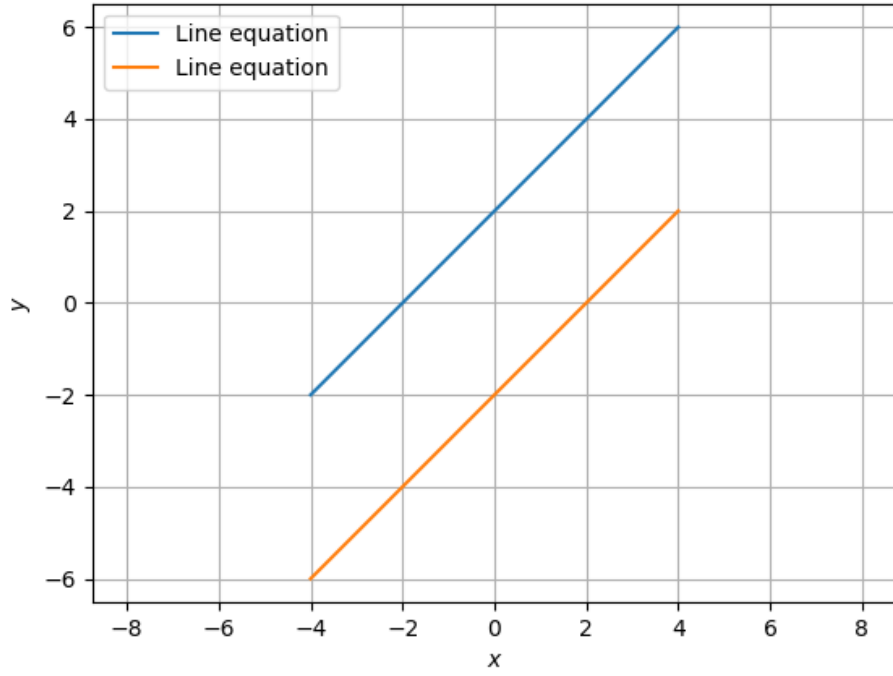


Figure 2