

# Assignment-4

EE224BTECH11044 - Muthyala Koushik

## I. INTERSECTION OF CONICS

**Question:** Using integration, find the area of the region bounded by the line  $y = 3x + 2$ , the  $x$ -axis and the ordinates  $x = -2$  and  $x = 1$

**Solution:**

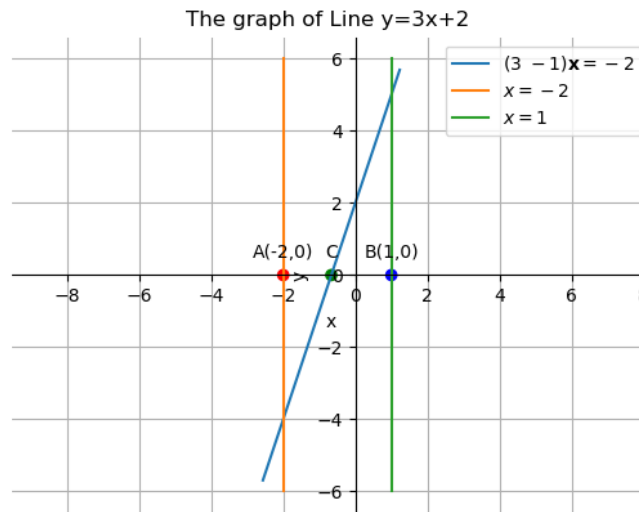


Fig. 1: The plot of the Line  $y = 3x + 2$

$$y = 3x + 2 \iff (3 - 1)x = -2$$

Let  $C \begin{pmatrix} a \\ 0 \end{pmatrix}$  be the point on  $y = 3x + 2$  on  $x$ -axis:

$$(3 - 1) \begin{pmatrix} a \\ 0 \end{pmatrix} = -2 \quad (1)$$

$$3a = -2 \iff a = -\frac{2}{3} \quad (2)$$

area of the  $y = 3x + 2$  between lines  $x = -2$  and  $x = 1$  is given by  $A = A_1 + A_2$   
 $A_1$ :Area from  $x = -2$  to  $x = -2/3$ ,  $A_2$ :Area from  $x = -2/3$  to  $x = 1$

$$A = \int_{-2}^{-\frac{2}{3}} |3x + 2| dx + \int_{-\frac{2}{3}}^1 |3x + 2| dx \quad (3)$$

$$A = \int_{-2}^{-\frac{2}{3}} -(3x + 2) dx + \int_{-\frac{2}{3}}^1 (3x + 2) dx \quad (4)$$

$$A = \left[ -\left(\frac{3}{2}x^2 + 2x\right) \right]_{-2}^{-\frac{2}{3}} + \left[ \left(\frac{3}{2}x^2 + 2x\right) \right]_{-\frac{2}{3}}^1 \quad (5)$$

$$A = \left(\frac{2}{3} - (-2)\right) + \left(\frac{7}{2} - \left(-\frac{2}{3}\right)\right) \quad (6)$$

$$A = \left(\frac{2}{3} + 2\right) + \left(\frac{7}{2} + \frac{2}{3}\right) \quad (7)$$

$$A = \frac{8}{3} + \frac{25}{6} \quad (8)$$

$$A = \frac{41}{6} \quad (9)$$

The area of the region bounded is  $\frac{41}{6}$