PDF 8.020 Cartesian Equation of a Line in R^2

If the slope of a line is $\frac{b}{a}$, then the direction vector is $\overrightarrow{(a, b)}$

If the Cartesian equation of a line is Ax + By + C = 0, then the slope of the line is –A/B.

If Ax + By + C = 0, then the normal vector is (A, B).

Example 1

Determine the equivalent vector and parametric equations of the line y = ¾ x + 2.

Example 2

Given the line r = (3, -6) + s(-1, -4), s ϵ R, determine the equivalent slope y-intercept form and Cartesian equation.

Example 3

Determine the Cartesian equation of the line passing through A (4, -2) that has the vector (5,3) as its normal.

Example 4

For what value of k are the line kx + 4y – 4 = 0 and 3x – 2y – 3 = 0 perpendicular?

Example 5

Determine the acute angle formed at the intersection of the following pair of lines.

L_1: (x,y) = (2,2) + s(-1, 3) and L_2: (x,y) = (5,1) + t (3,4)

Example 6

Determine the acute and obtuse angle between the lines

3x – 2y + 7 = 0 and x + 4y – 17 = 0

Example 7

The line segment joining A(2, 0) and B(5,3) is the hypotenuse of a right triangle. The third vertex, C, lies on the line $\vec{r} = \overrightarrow{(3,1)} + t\overrightarrow{(1,-2)}$. Determine the coordinates of C (there might be more than one answer)