8.2 Cartesian and Symmetric Equations of Lines

Example 8.2.1

Determine vector and parametric equations for the line through $P_0(2,-1)$ and with direction vector $\vec{m}=(2,-3)$.

Wait what if we solve both parametric equations for *t*?

In general the symmetric equation for a line $\left(\text{in } \mathbb{R}^2\right)$ given $P_0(x_0, y_0)$ and $\vec{m}=(a,b)$ is:

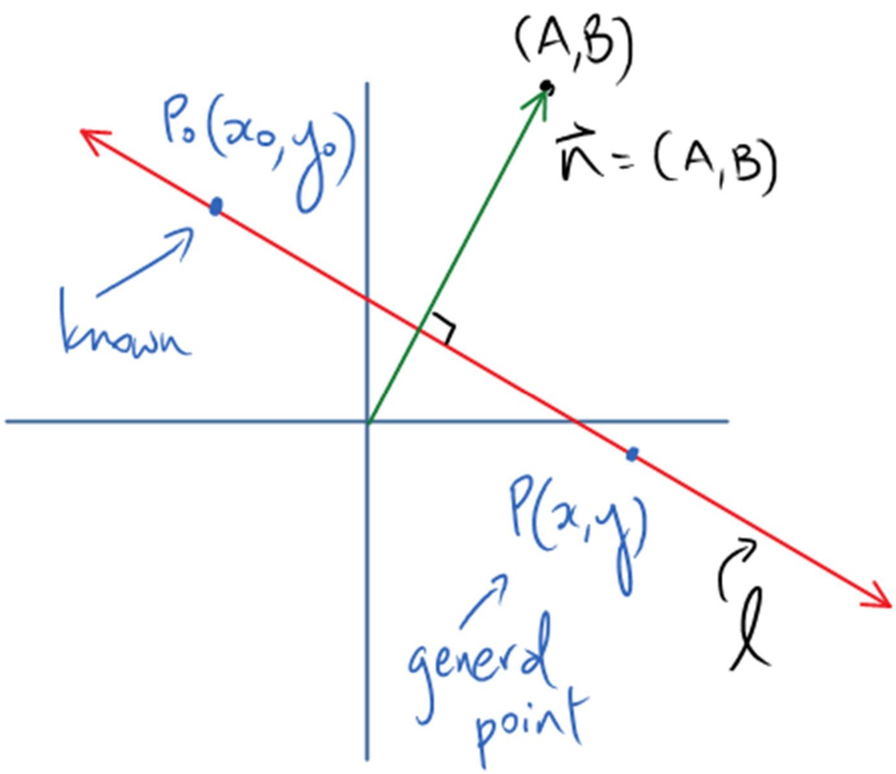
Example 8.2.2

Determine vector, parametric and symmetric equations for the line (in "scalar" form)

$$y = -\frac{2}{3}x + 4$$

The Cartesian Equation of a Line

Consider the following sketch:



Note: We DO NOT know the direction vector for line *l*!

Definition 8.2.1

A **normal vector** $\vec{n} = (A, B)$ to a line with direction vector $\vec{m} = (a, b)$

Example 8.2.3

Determine an equation of a line which is perpendicular to $3x - 4y + 5 = 0$.

Example 8.2.4

Determine the Cartesian equation of a line in $\mathbb{R}^2$ passing through $P_0(5,-2)$ with normal $\vec{n}=(2,-7)$.

Example 8.2.5

Given lines

$$l_1:(x,y)=(1,3)+t(2,3)$$
$$l_2:(x,y)=(0,-2)+s(-1,4)$$

Determine the angle between l_1 and l_2.

Class/Homework for Section 8.2

Pg. 442 Investigation (whistle a happy tune)
Pg. 443 – 444 #1 – 3, 5 – 7, 9, 10, 12