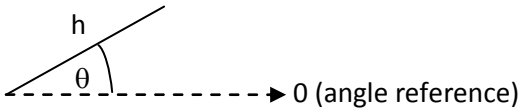
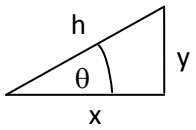
Maths Crib Sheet 2 – Polar Co-ordinate Space

Polar Co-ordinate Space

Polar co-ordinates consist of an angle (θ) and distance (h) :



Converting from Cartesian to Polar Co-ords



x and y are known distances in Cartesian space.

$$h = \sqrt{x^2 + y^2}$$

From crib sheet 1 we know that:

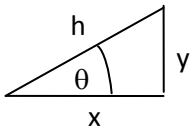
$$\tan\theta = \frac{o}{a} = \frac{y}{x}$$

So:

$$\theta = \arctan(y/x)$$

NOTE: arctan can not determine which quadrant θ falls into. However, in math.h there is a function called atan2 which taken y and x as it's parameters and returns a quadrant safe value between –πand +π

Converting from Polar to Cartesian Co-ords



h and θ are known in polar space.

From crib sheet 1 we know that:

$$\cos\theta = \frac{a}{h} = \frac{x}{h}$$

and

$$\sin\theta = \frac{o}{h} = \frac{y}{h}$$

So:

$$x = h \times \cos(\theta)$$

$$y = h \times \sin(\theta)$$