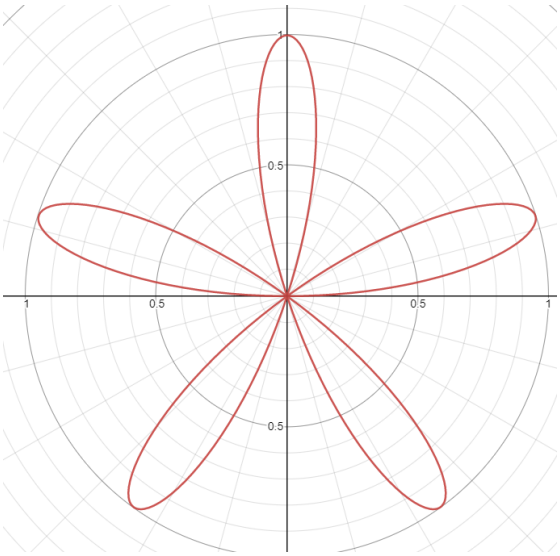
Conversion from Cartesian Coordinates to Polar Coordinates

Unlike Cartesian Coordinates which tells you specifically where a point is on the plane, for Polar Coordinates, it gives you two pieces of information, namely the **(i)** distance from the origin (known as the pole in this context) and the **(ii)** angle the line segment joining the pole to the known point makes with the positive part of the *x*-axis.

We have the fundamental results: $x = r\cos\theta$ and $y = r\sin\theta$, where r is known as the radius vector and θ is known as the vectorial angle. Thus,

$$r^2 = x^2 + y^2 \text{ and } \tan\theta = \frac{y}{x}.$$



Graph of a flower with equation $r = \sin 5\theta$

Graphing such beautiful patterns like a flower shown above are extremely difficult using Cartesian Coordinates. Its polar equation is thankfully $r = \sin 5\theta$, but in Cartesian form, it is

$$\sqrt{x^2 + y^2} = \sin\left[5\tan^{-1}\left(\frac{y}{x}\right)\right]!$$