= 1 , it defines a parabola ; and if e < 1 , it defines an ellipse . The special case e = 0 of the latter results in a circle of radius <formula> .

= = Intersection of two polar curves = =

The graphs of two polar functions <formula> and <formula> have possible intersections in 3 cases :

In the origin if the equations <formula> and <formula> have at least one solution each .
All the points <formula> where <formula> are the solutions to the equation <formula> .
All the points <formula> where <formula> are the solutions to the equation <formula> where <formula> is an integer .

= = Complex numbers = =

Every complex number can be represented as a point in the complex plane , and can therefore be expressed by specifying either the point 's Cartesian coordinates (called rectangular or Cartesian form) or the point 's polar coordinates (called polar form) . The complex number z can be represented in rectangular form as
<formula>
where i is the imaginary unit , or can alternatively be written in polar form (via the conversion formulae given above) as
<formula>
and from there as
<formula>
where e is Euler 's number , which are equivalent as shown by Euler 's formula . (Note that this formula , like all those involving exponentials of angles , assumes that the angle ? is expressed in radians .) To convert between the rectangular and polar forms of a complex number , the conversion formulae given above can be used .
For the operations of multiplication , division , and exponentiation of complex numbers , it is generally much simpler to work with complex numbers expressed in polar form rather than rectangular form . From the laws of exponentiation :
Multiplication :
<formula>
Division :
<formula>
Exponentiation (De Moivre 's formula) :
<formula>

= = Calculus = =

Calculus can be applied to equations expressed in polar coordinates .
The angular coordinate ? is expressed in radians throughout this section , which is the conventional choice when doing calculus .

= = = Differential calculus = = =