= u2 + v2 and ? is the " angle " ? =
atan2 (v , u) . The polar angle ? is ambiguous since any integer multiple of 2? could be added to ? without changing the location of the point . Each choice of ? gives in general a different possible value of the power . A branch cut can be used to choose a specific value . The principal value (the most common branch cut) , corresponds to ? chosen in the interval (? ? , ?] . For complex numbers with a positive real part and zero imaginary part using the principal value gives the same result as using the corresponding real number .
In order to compute the complex power wz , write w in polar form :
<formula>
Then
<formula>
and thus
<formula>
If z is decomposed as c + di , then the formula for wz can be written more explicitly as
<formula>
This final formula allows complex powers to be computed easily from decompositions of the base into polar form and the exponent into Cartesian form . It is shown here both in polar form and in Cartesian form (via Euler 's identity) .
The following examples use the principal value , the branch cut which causes ? to be in the interval (? ? , ?] . To compute ii , write i in polar and Cartesian forms :
<formula>