Complex numbers

Study Development Quick Guide

## Complex number arithmetic

There are several rules for manipulating complex numbers.

Addition:

Subtraction:

Multiplication:

Division:

## Polar form

## Modulus

The ‘modulus’, , is the length of the line between and the origin. We calculate this using Pythagoras’s Theorem: , so therefore

## Argument and quadrant adjustments

The ‘argument’ is the angle between z and the real axis. We calculate this using the tangent function: , and so We then adjust based on the quadrant that is in to find the argument

|  |  |  |
| --- | --- | --- |
| **Quadrant** | **x and y values**  |  **from**  |
| 1st  | x > 0, y > 0 |  |
| 2nd  | x < 0, y > 0 |  |
| 3rd  | x < 0, y < 0 |  |
| 4th  | x > 0, y < 0 |  |

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## Converting from polar form to Cartesian

If we are given a complex number in the form or and we want to put it into the form we can follow these steps:

1. Calculate .
2. Calculate
3. Write the number in the form

## Converting from Cartesian to polar form

If we are given a complex number of the form and we would like it in the form or , we do the following:

1. Calculate
2. Calculate
3. Adjust based on the quadrant of to get
4. Write the number in the form or

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