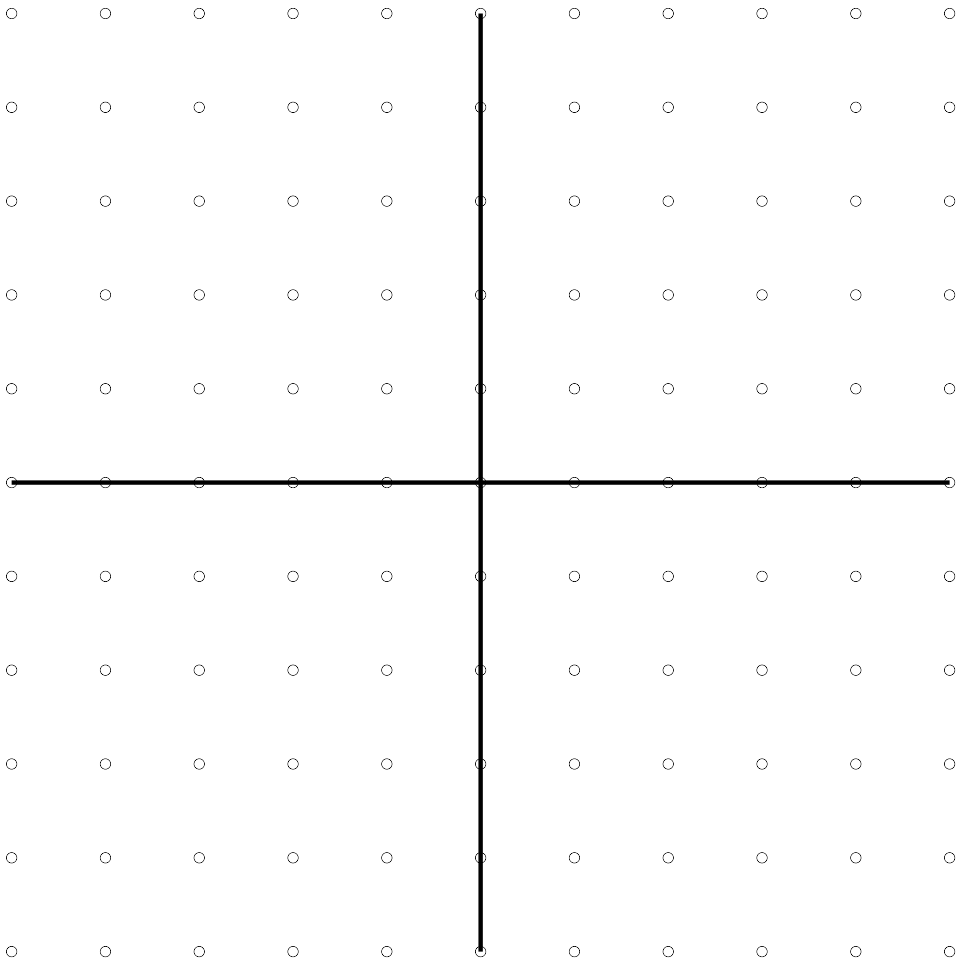
Episode 03 – Gaussian integers

European section – Season 3

Gaussian integers on a lattice



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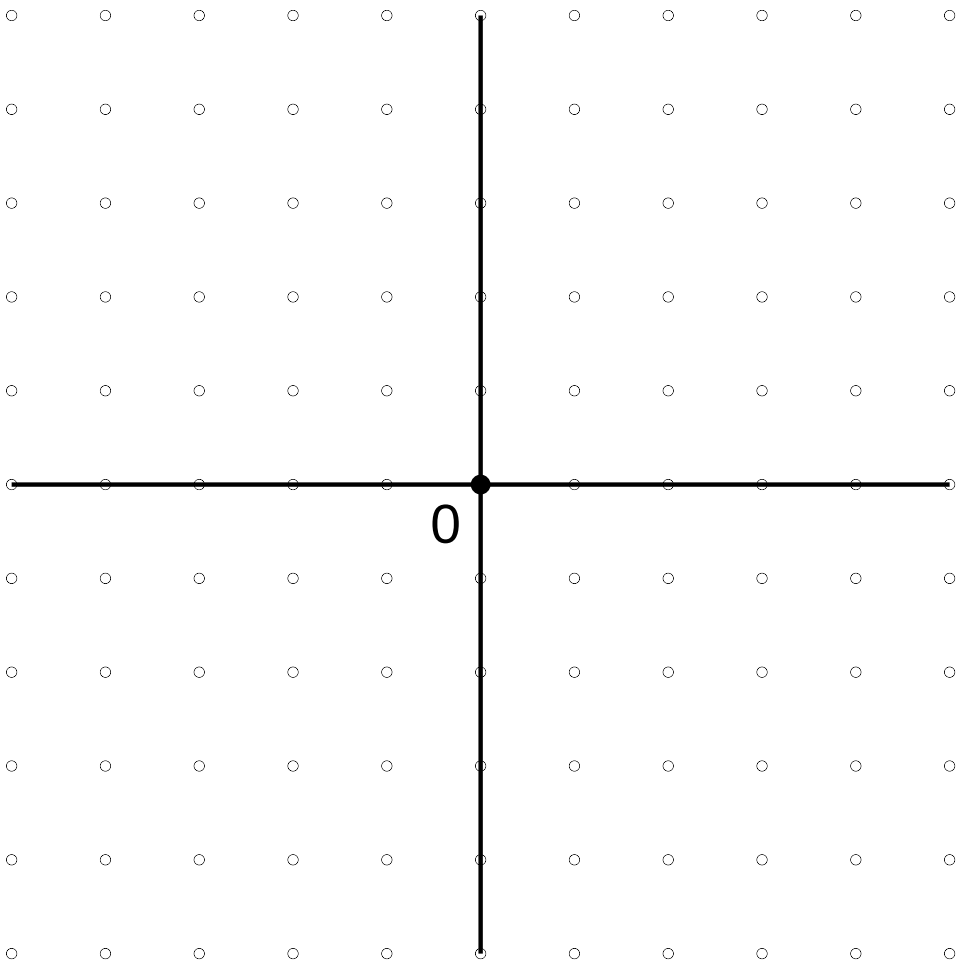

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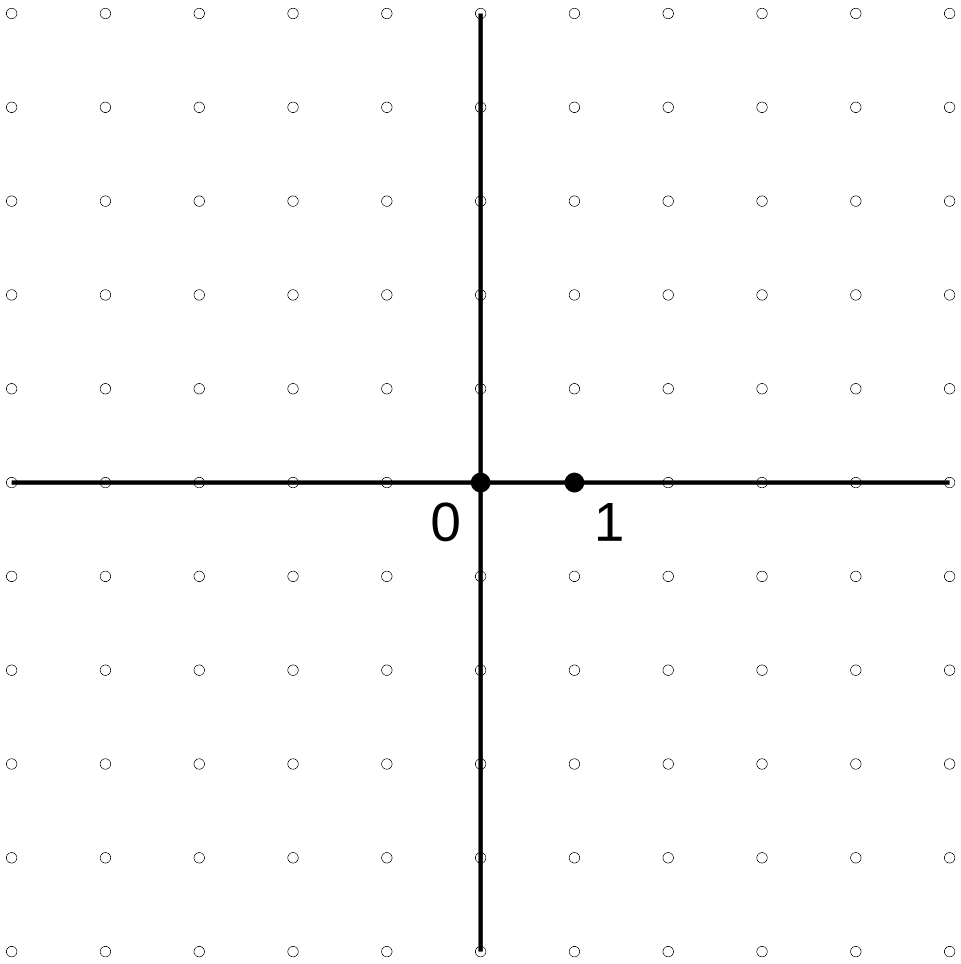

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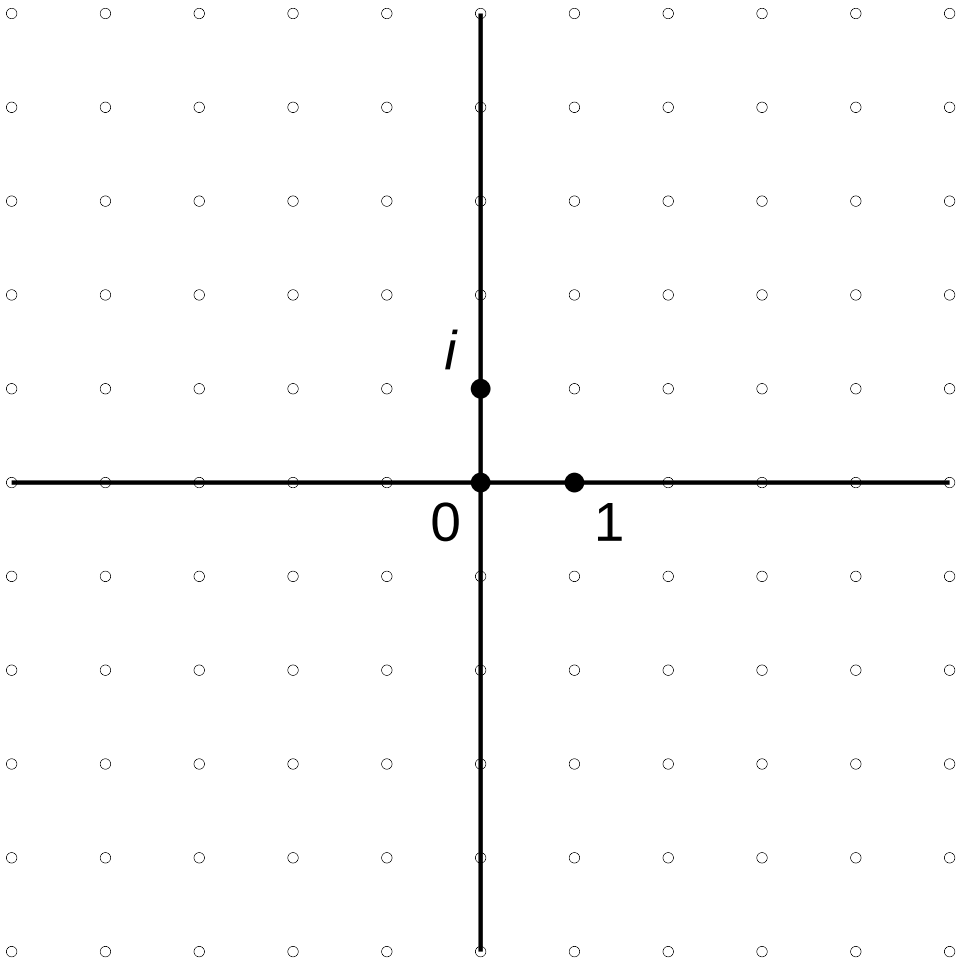

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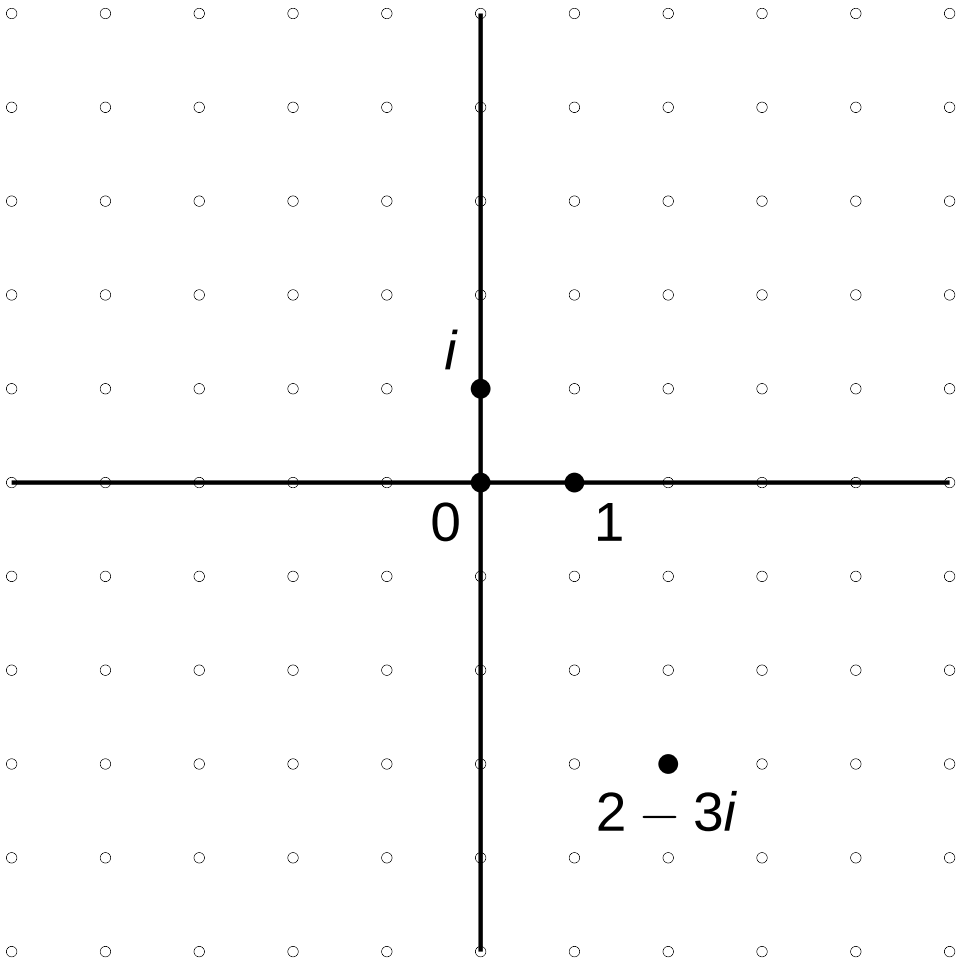

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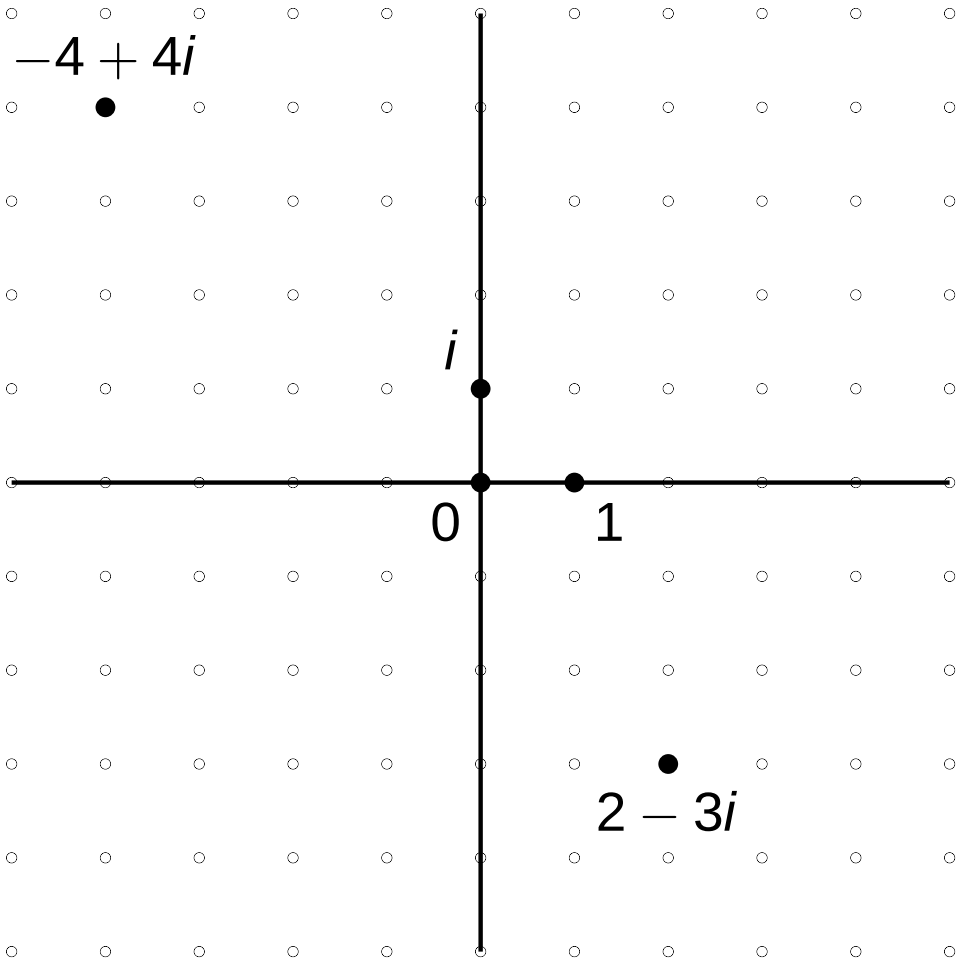

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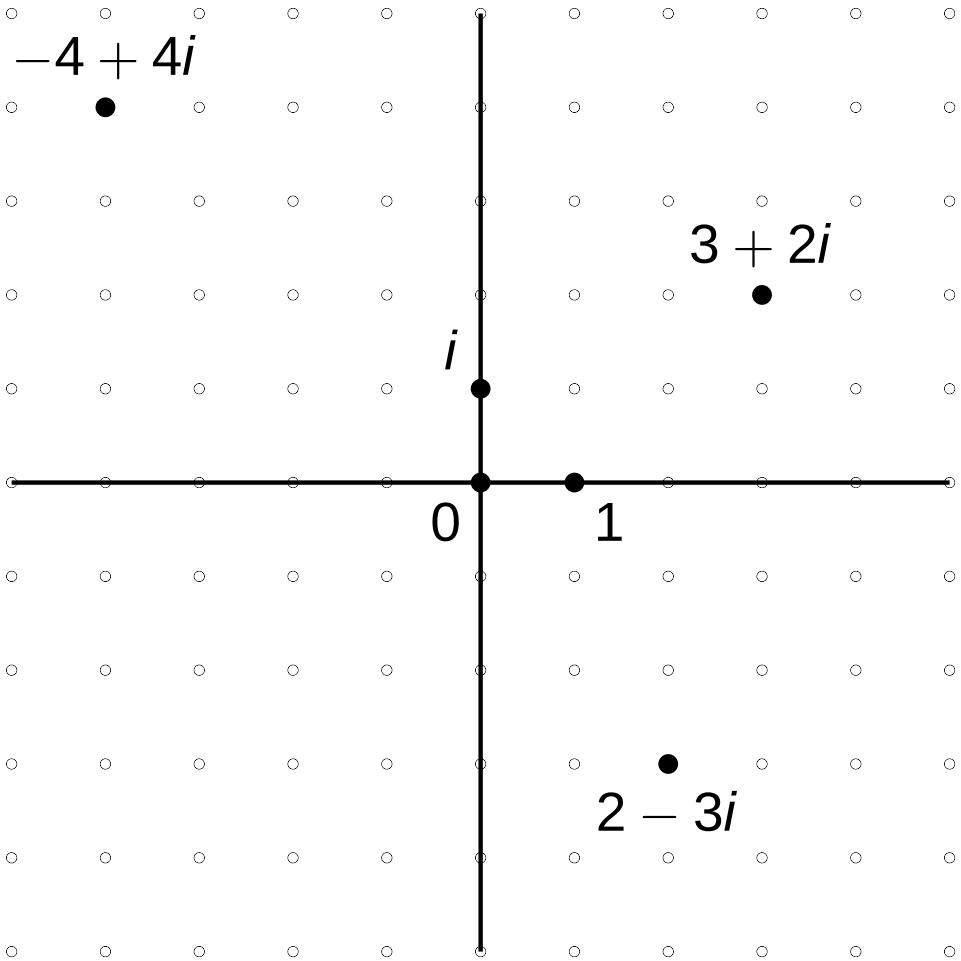

Operations in the set of Gaussian integers

Definition (Gaussian integers)

A *Gaussian integer* is a number of the form $a + bi$ where a and b are two integers and i is an imaginary number such that $i^2 = -1$. The set of all Gaussian integers is usually noted $Z[i]$.

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Golden rule

Addition and multiplication in the set $Z[i]$ follow the same rules as addition and multiplication of integers but “real parts” and “imaginary parts” cannot be mixed up in addition.

Addition and multiplication of points ?

Question 1

What is the graphical effect of adding a Gaussian integer to another ?

Addition and multiplication of points ?

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Question 2

What is the graphical effect of multiplying a Gaussian integer by another ?

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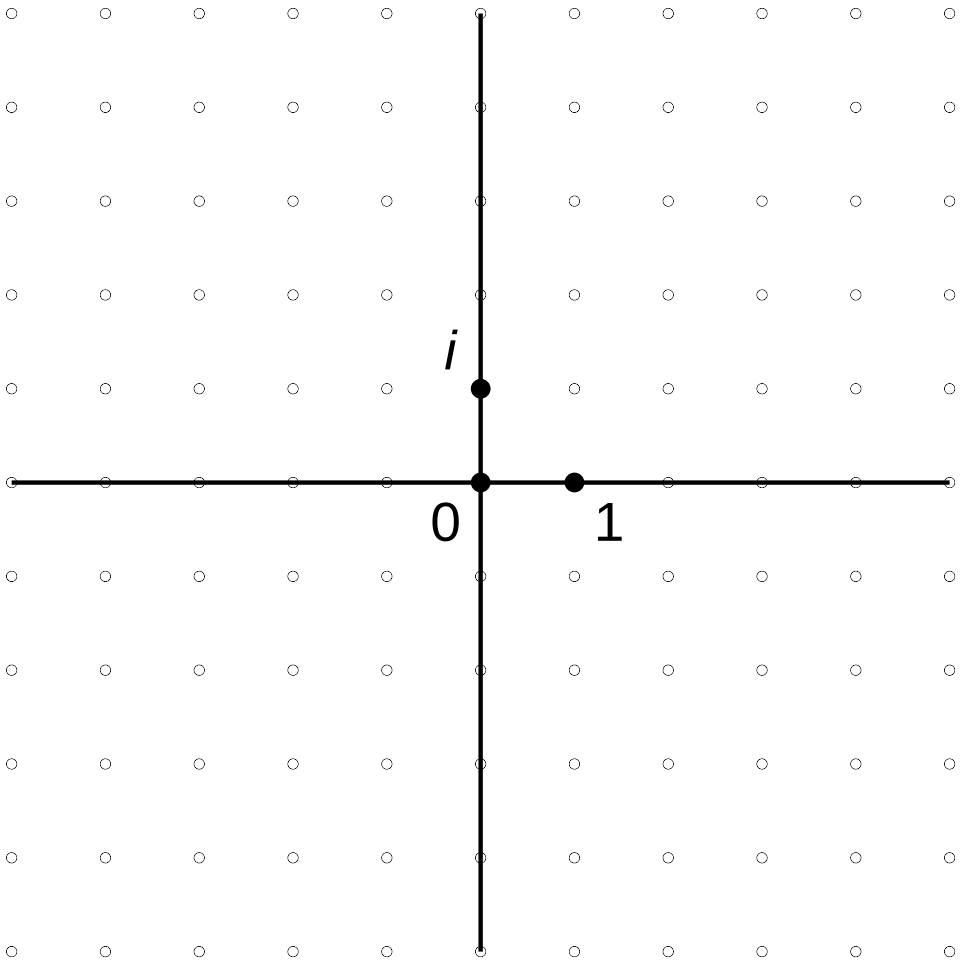
Study the problem for :

- multiplication by a real number b ;
- multiplication by the imaginary number i ;
- multiplication by the imaginary number bi.

Addition and translation



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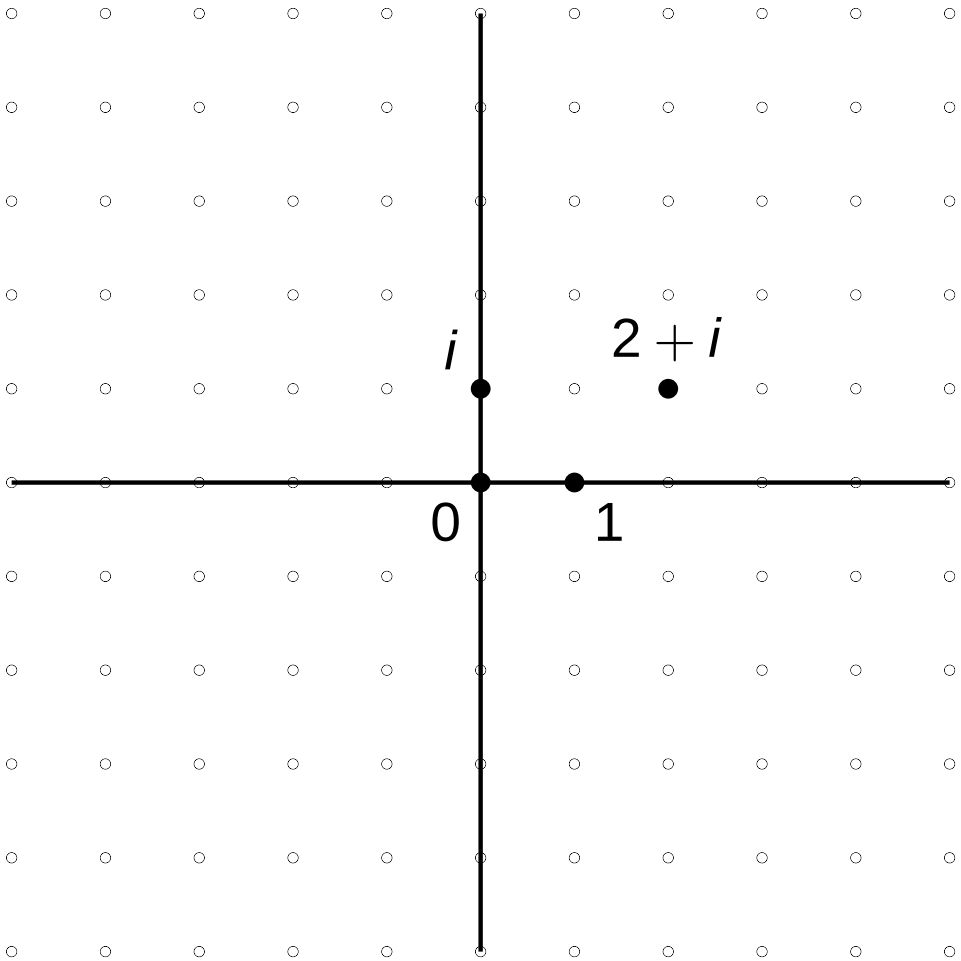

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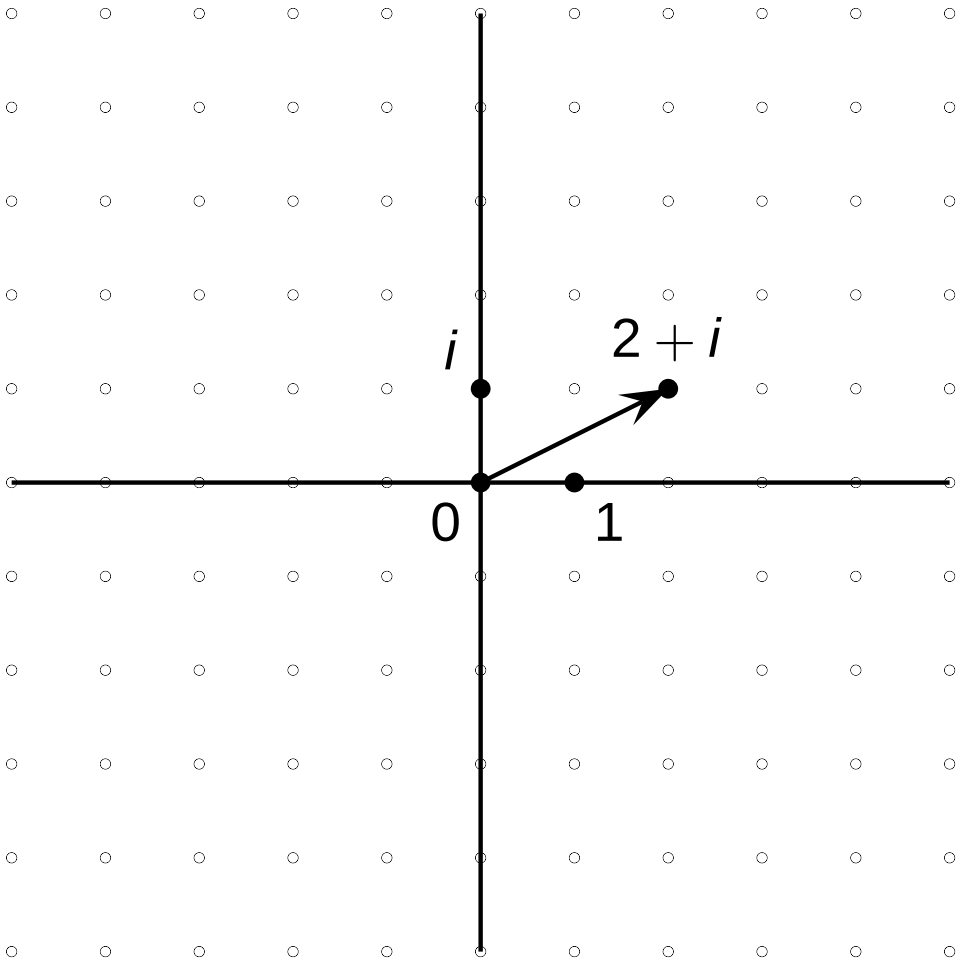

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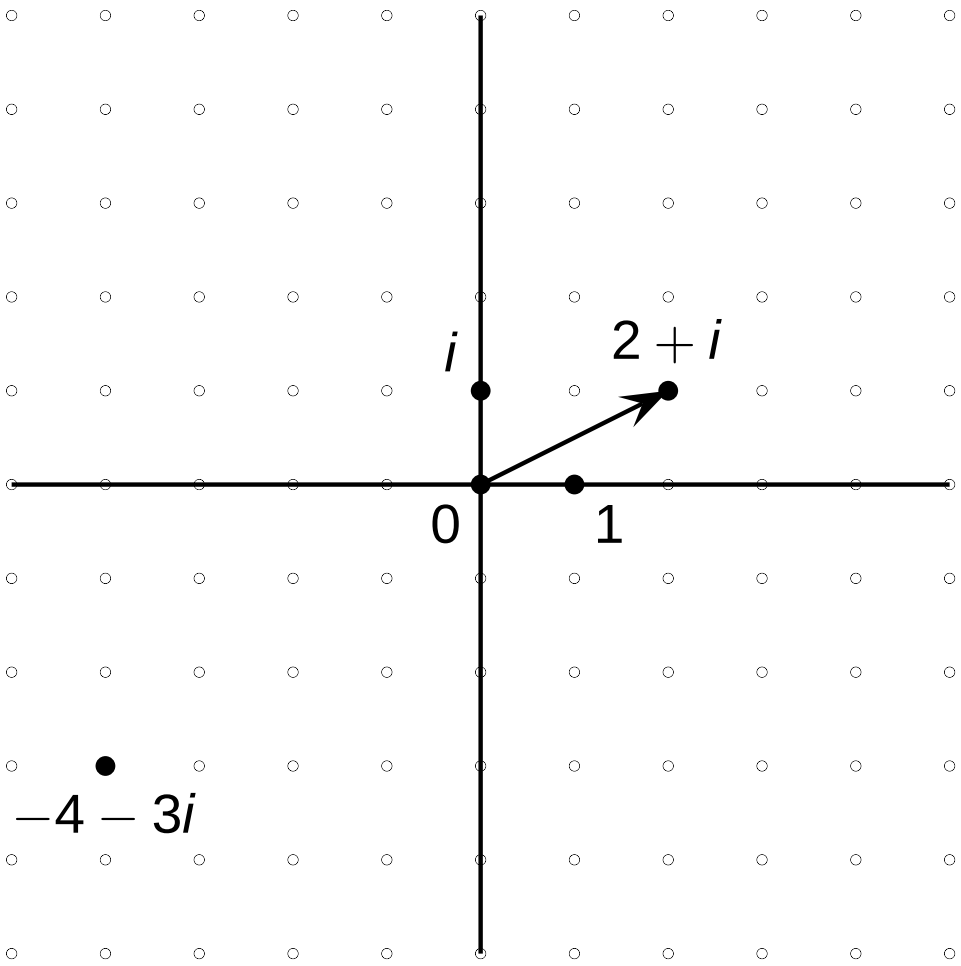

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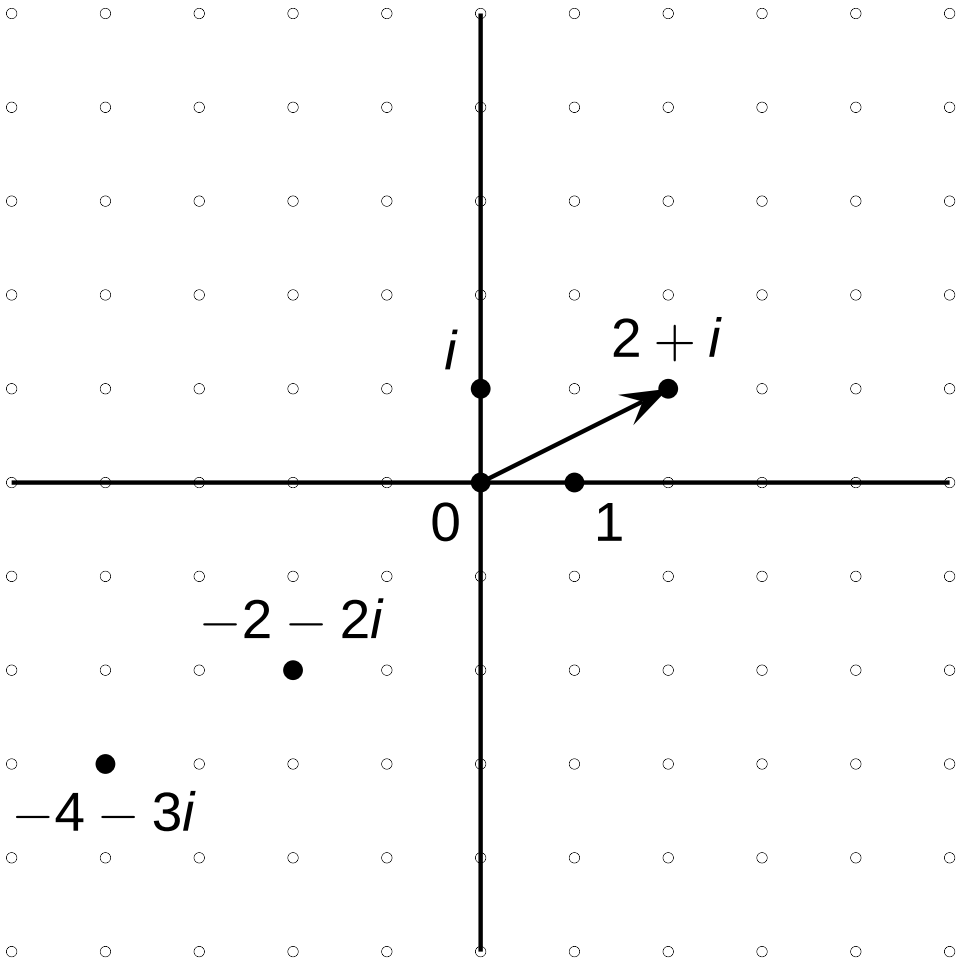

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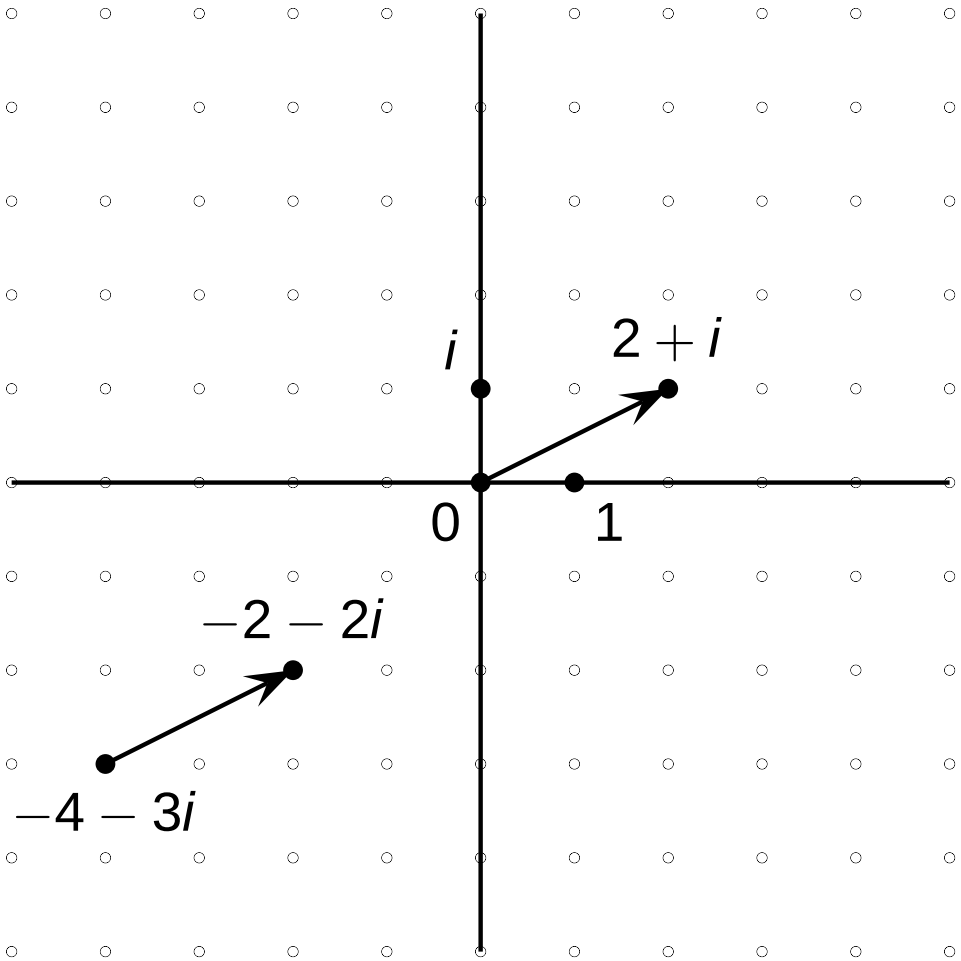

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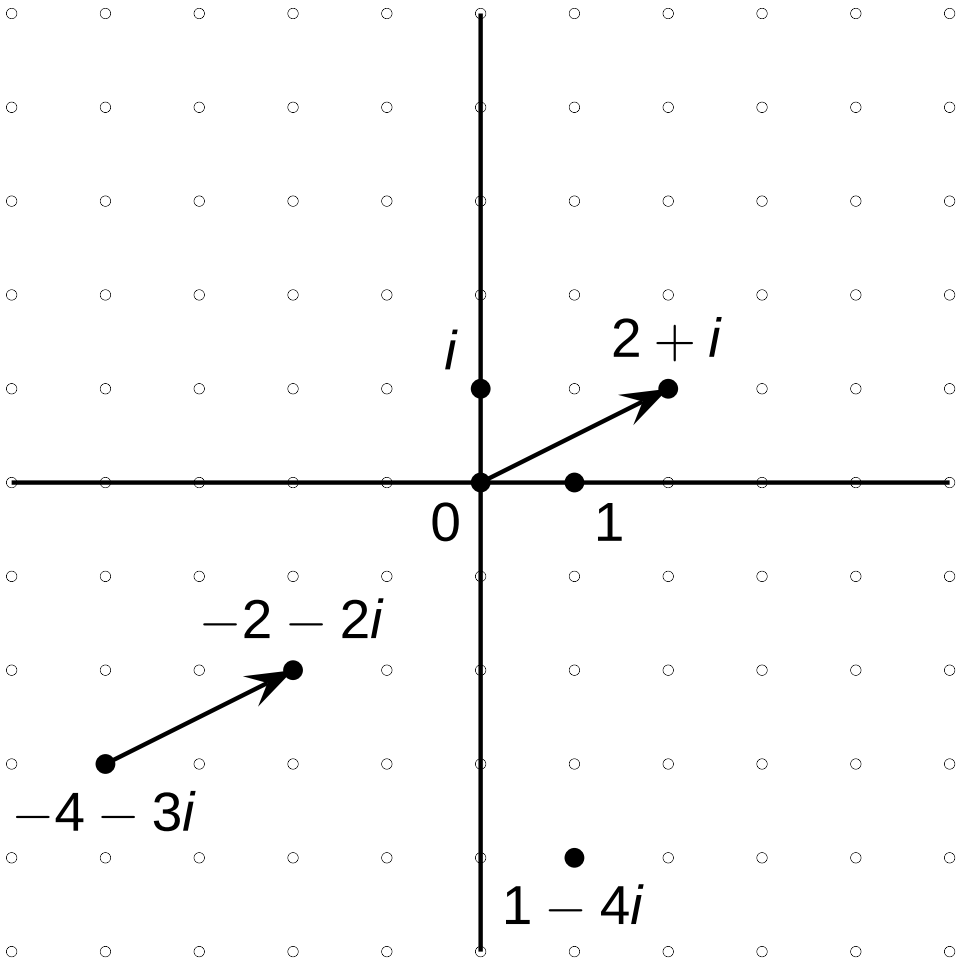

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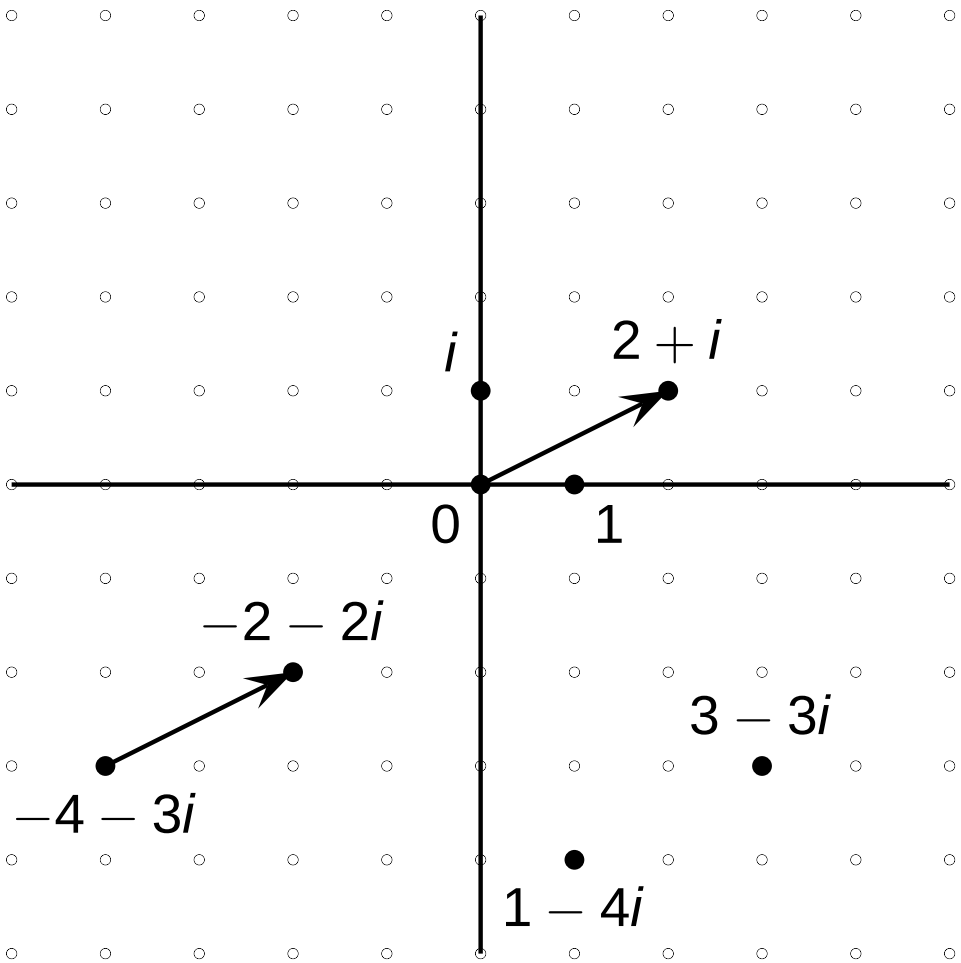

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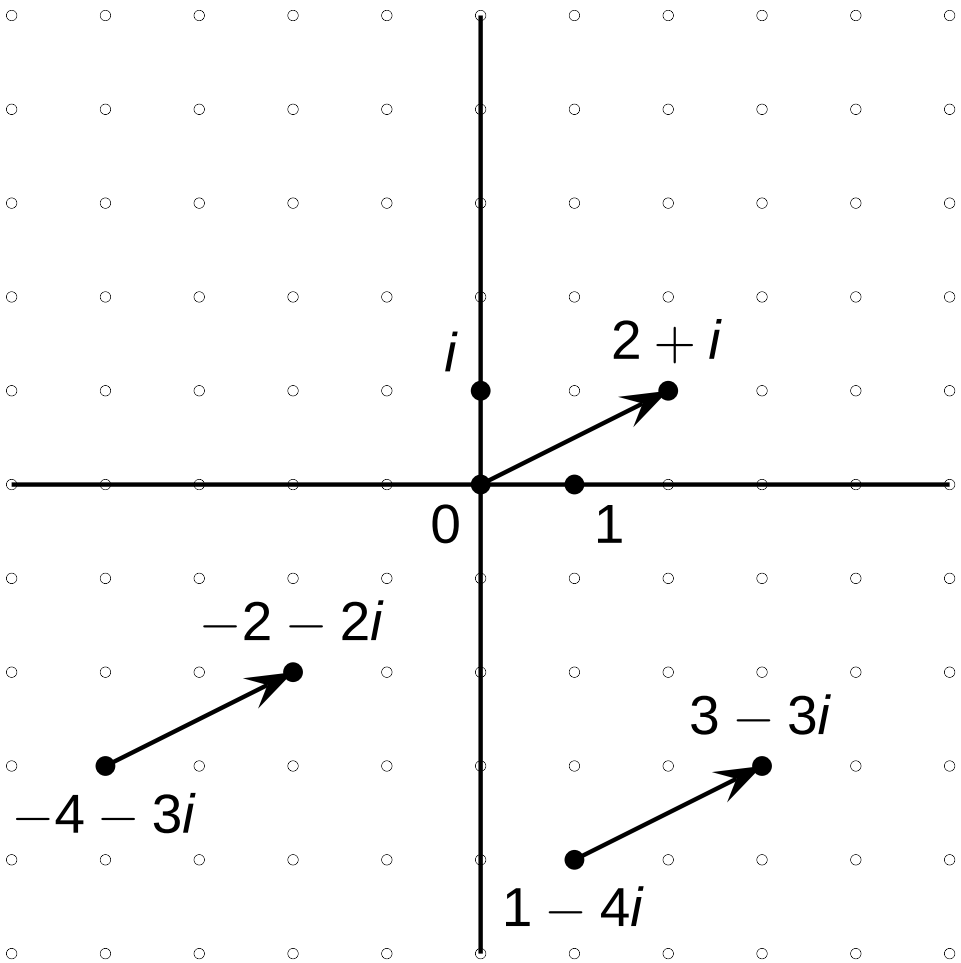

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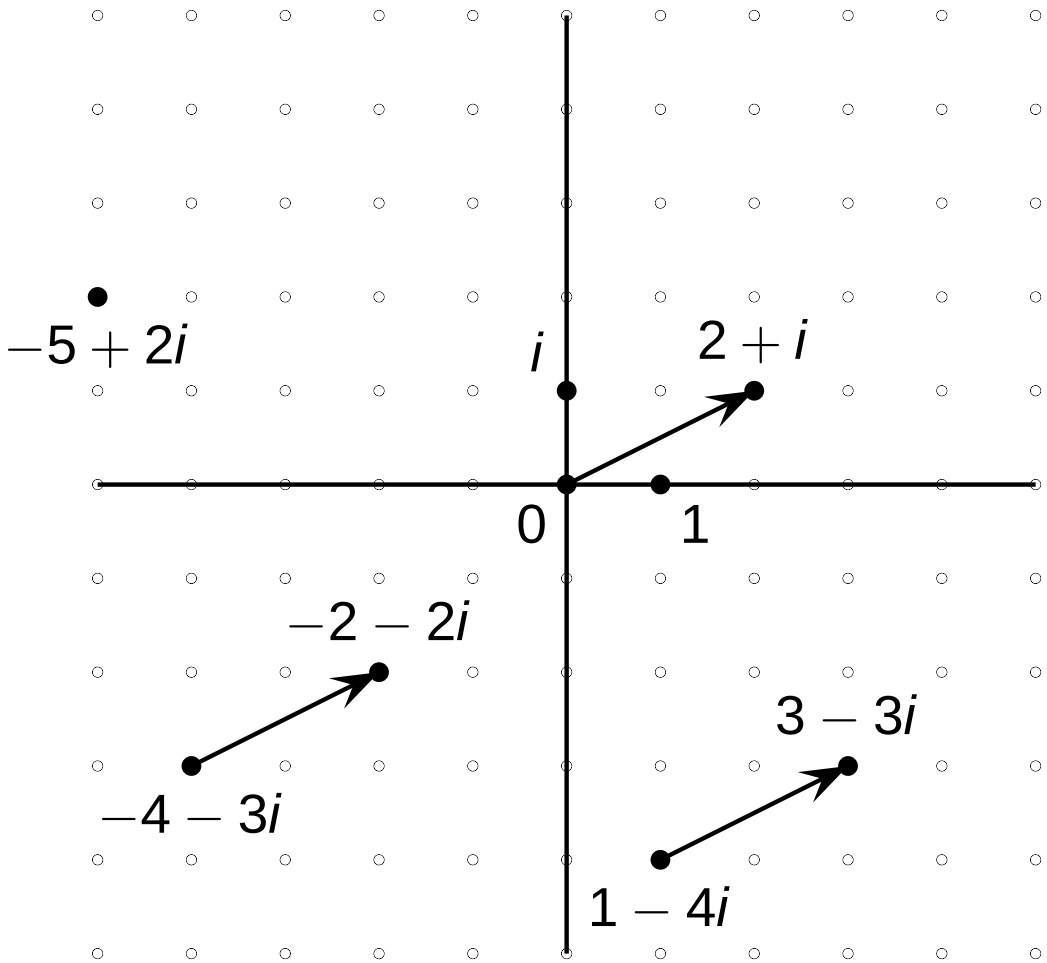

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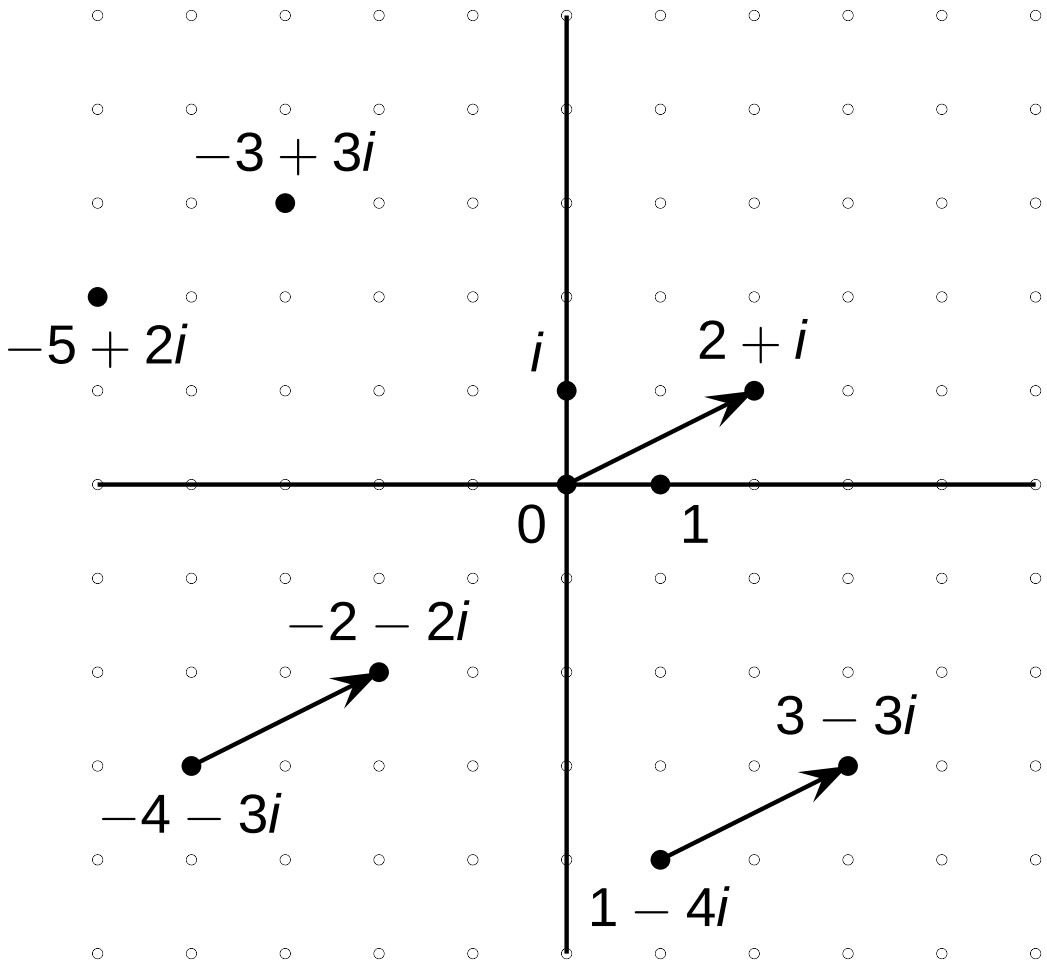

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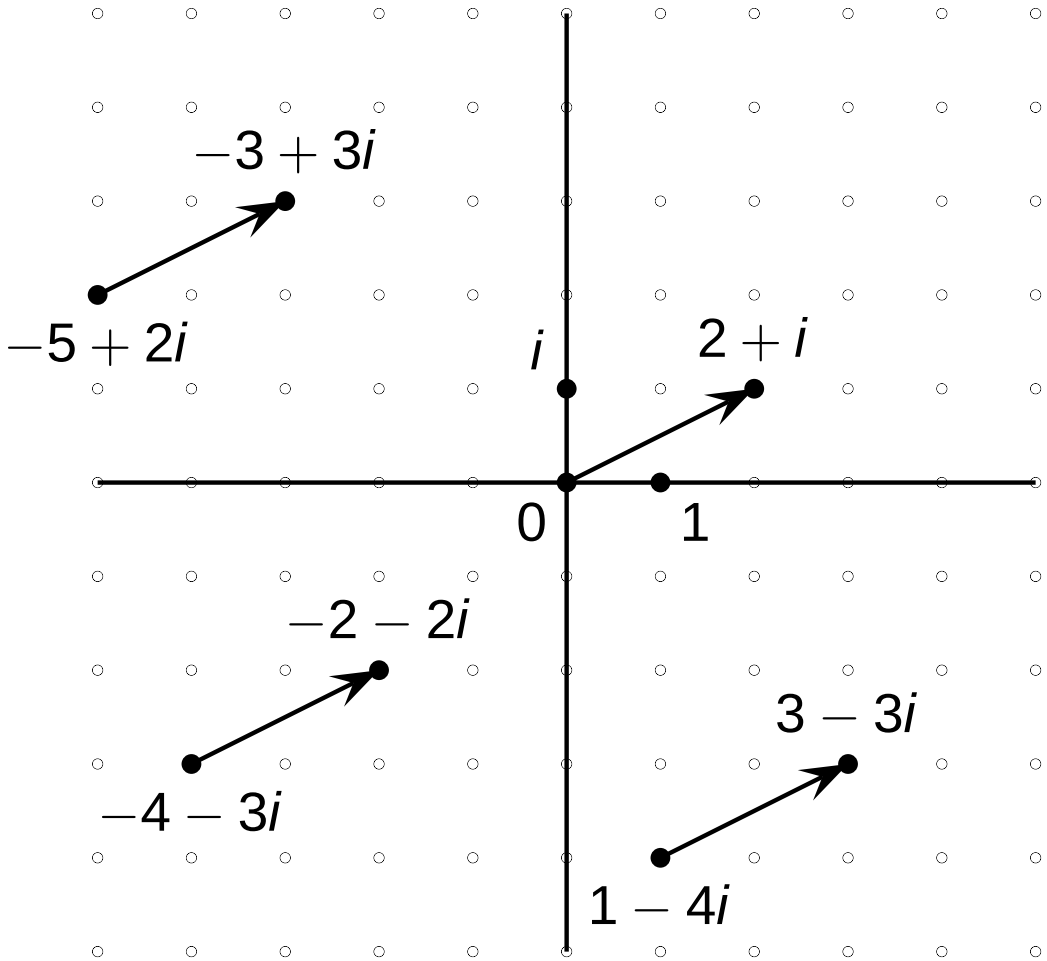
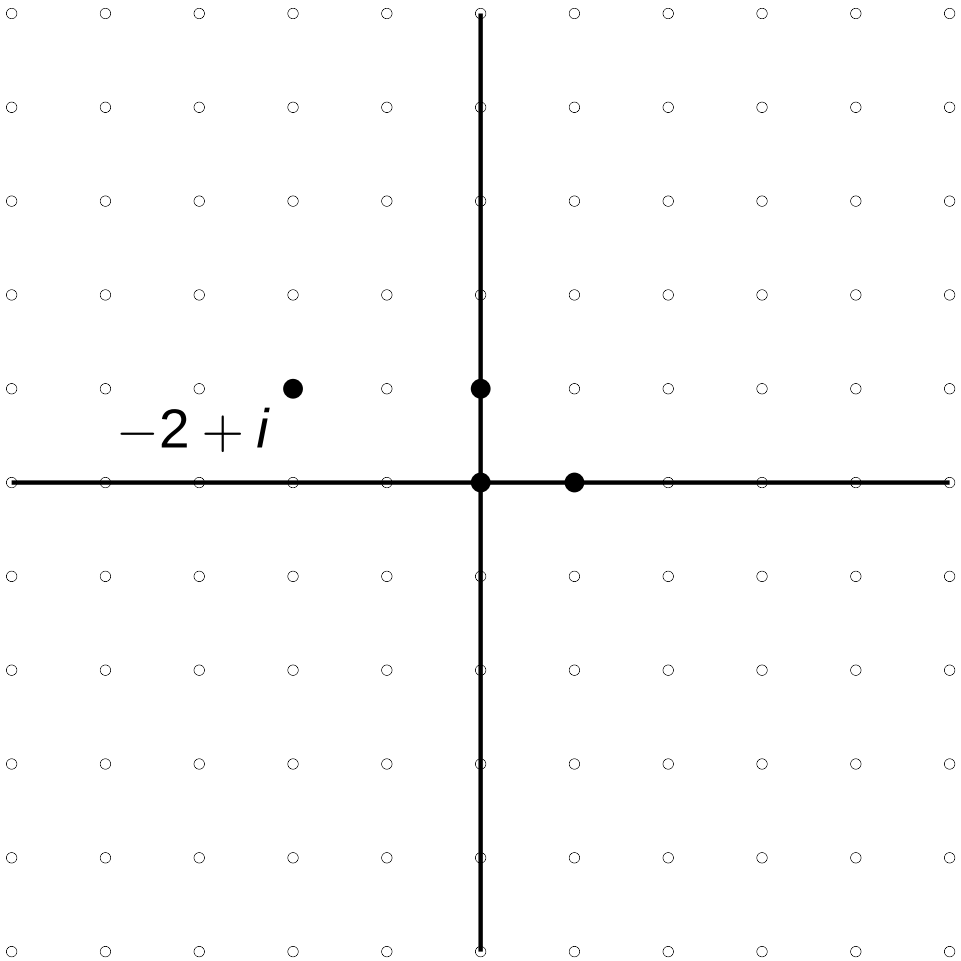


Multiplication, homothety and rotation



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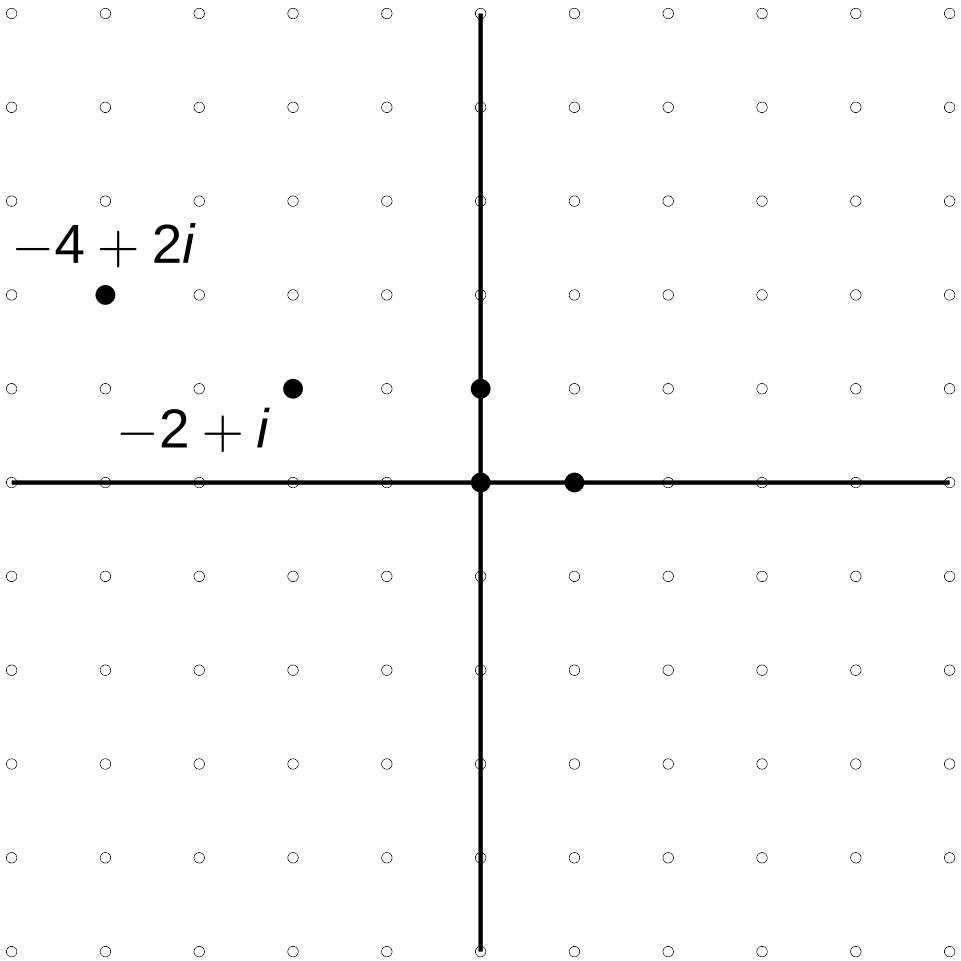

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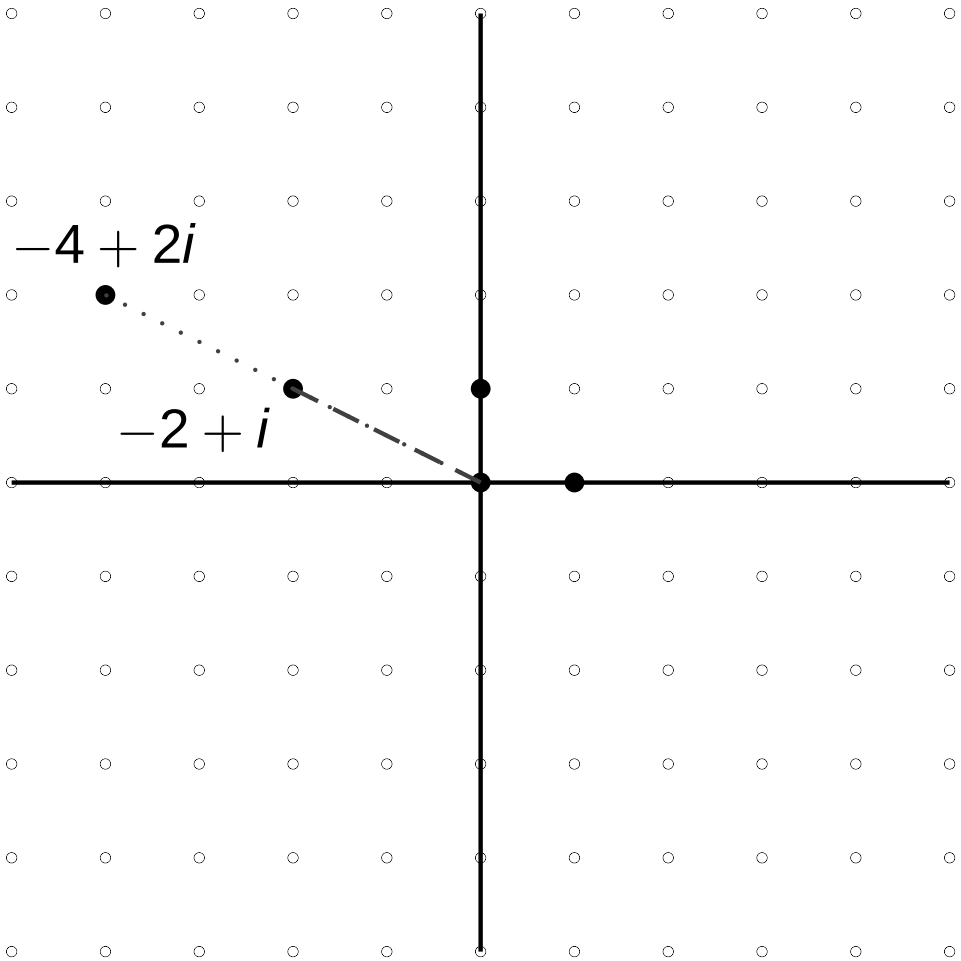

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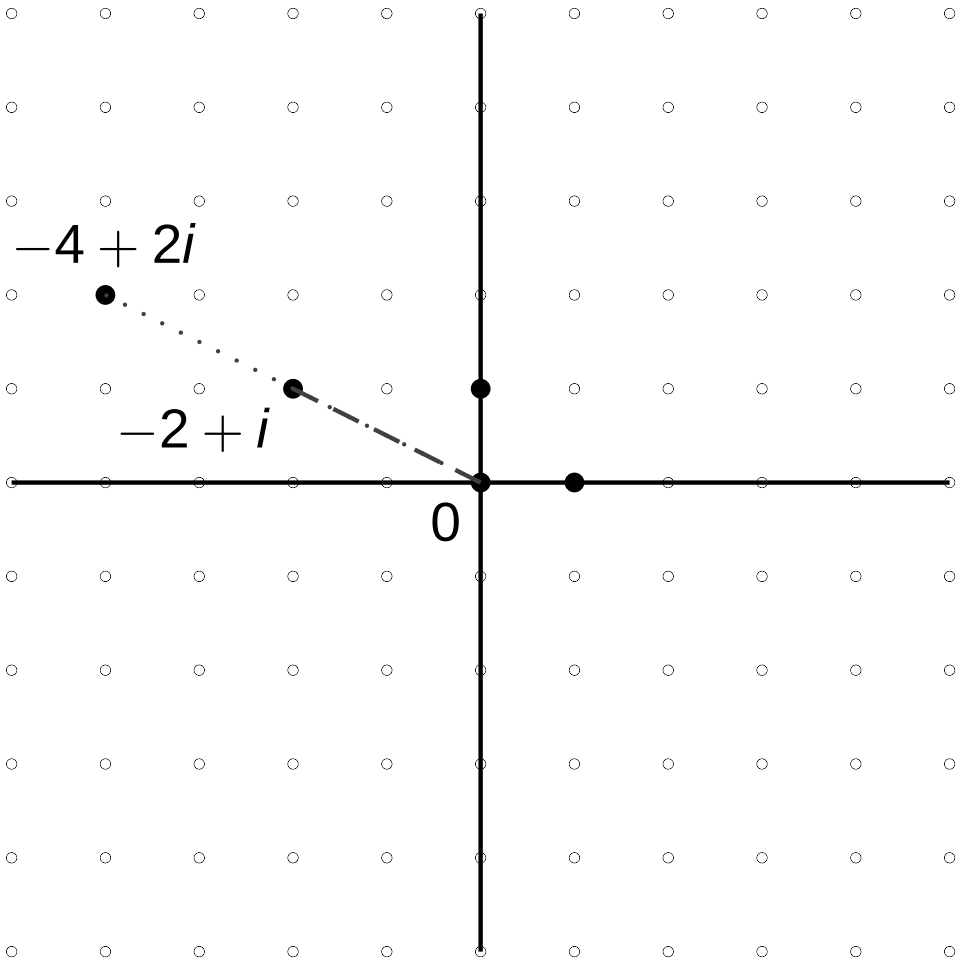

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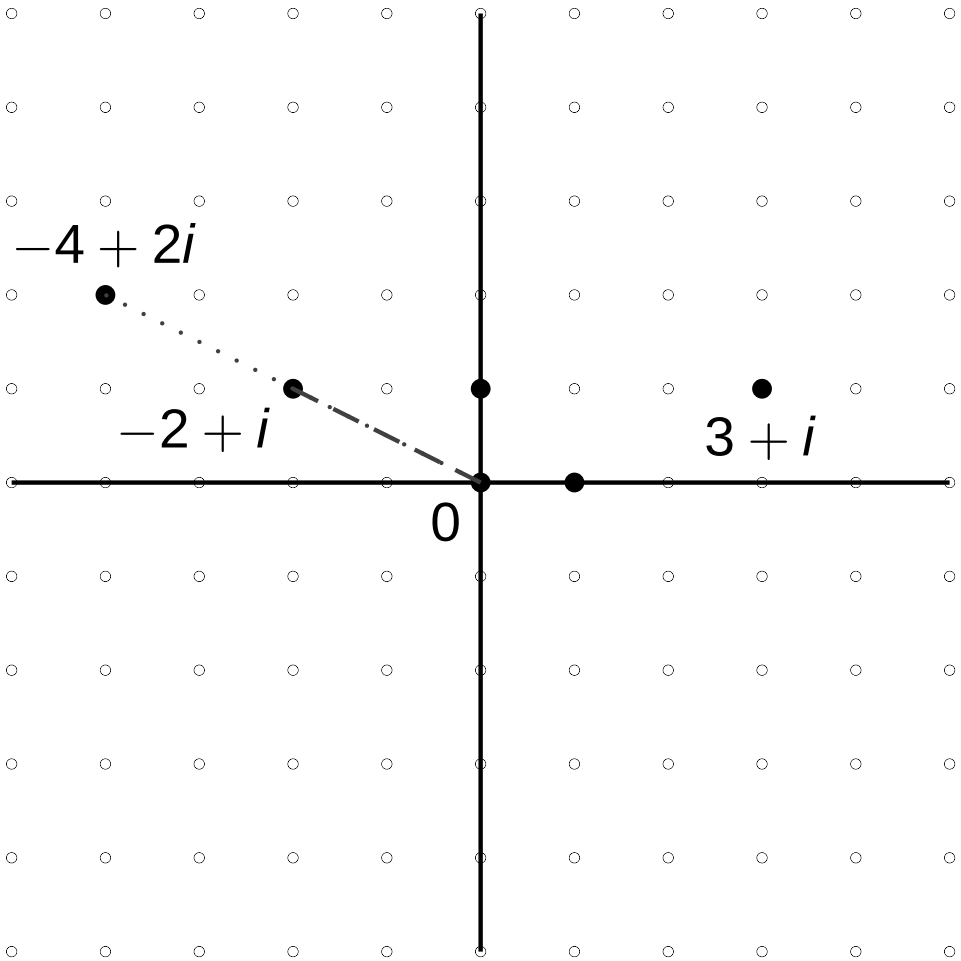

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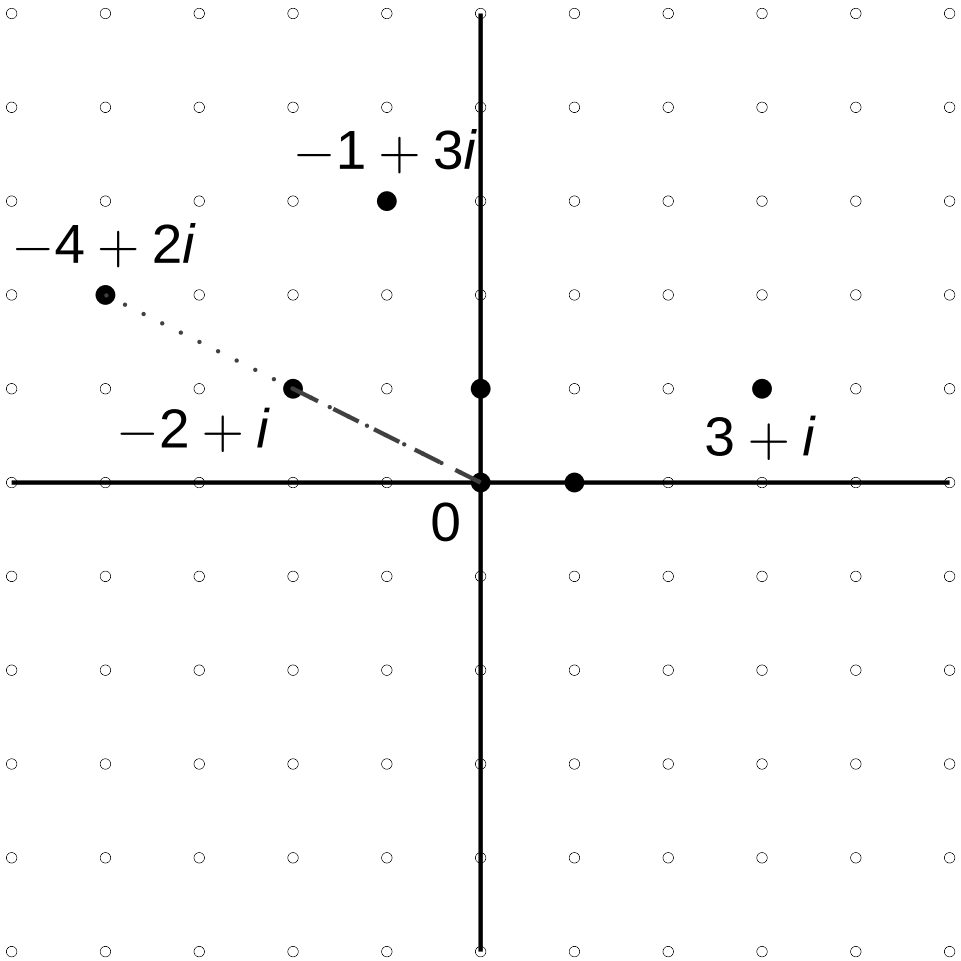

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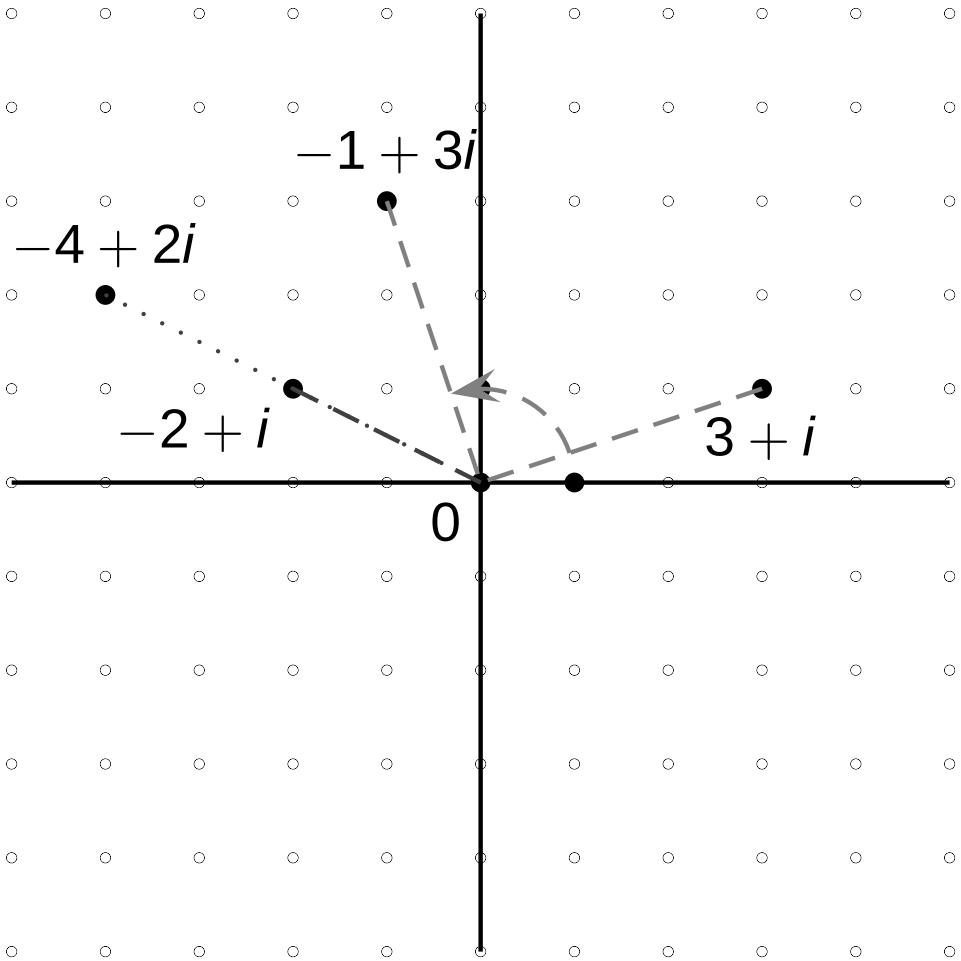

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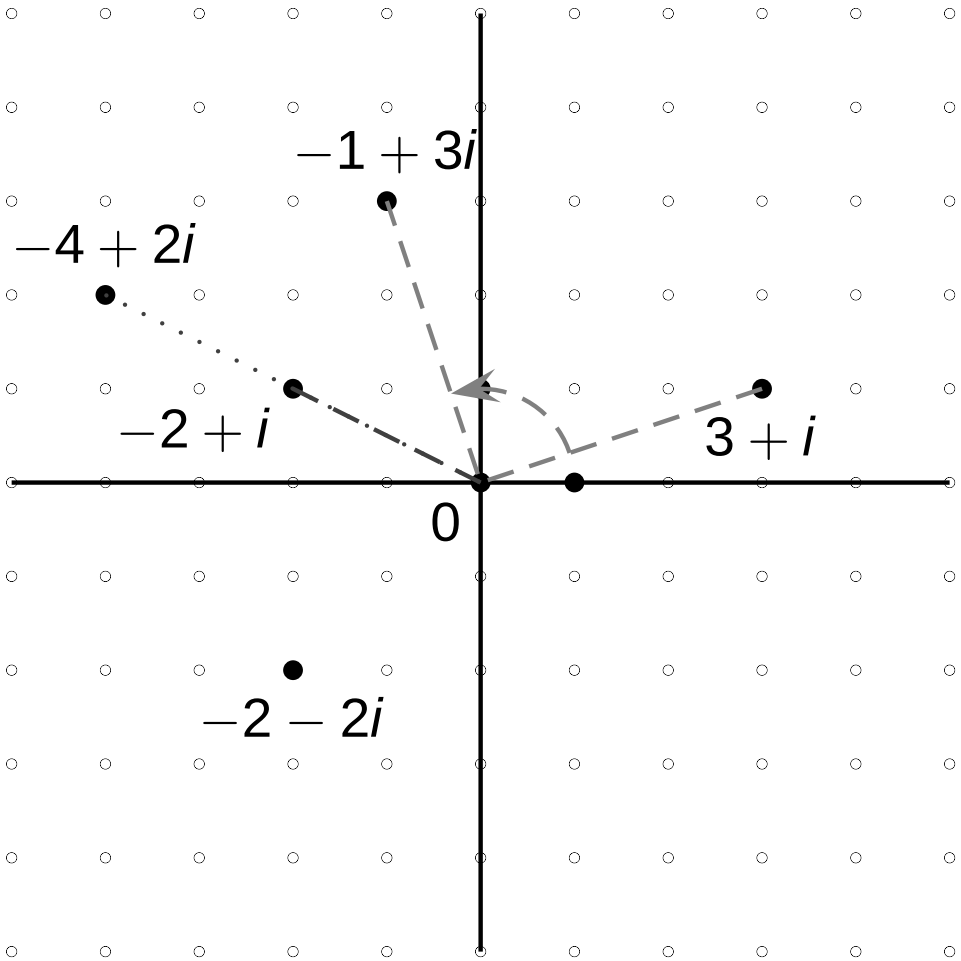

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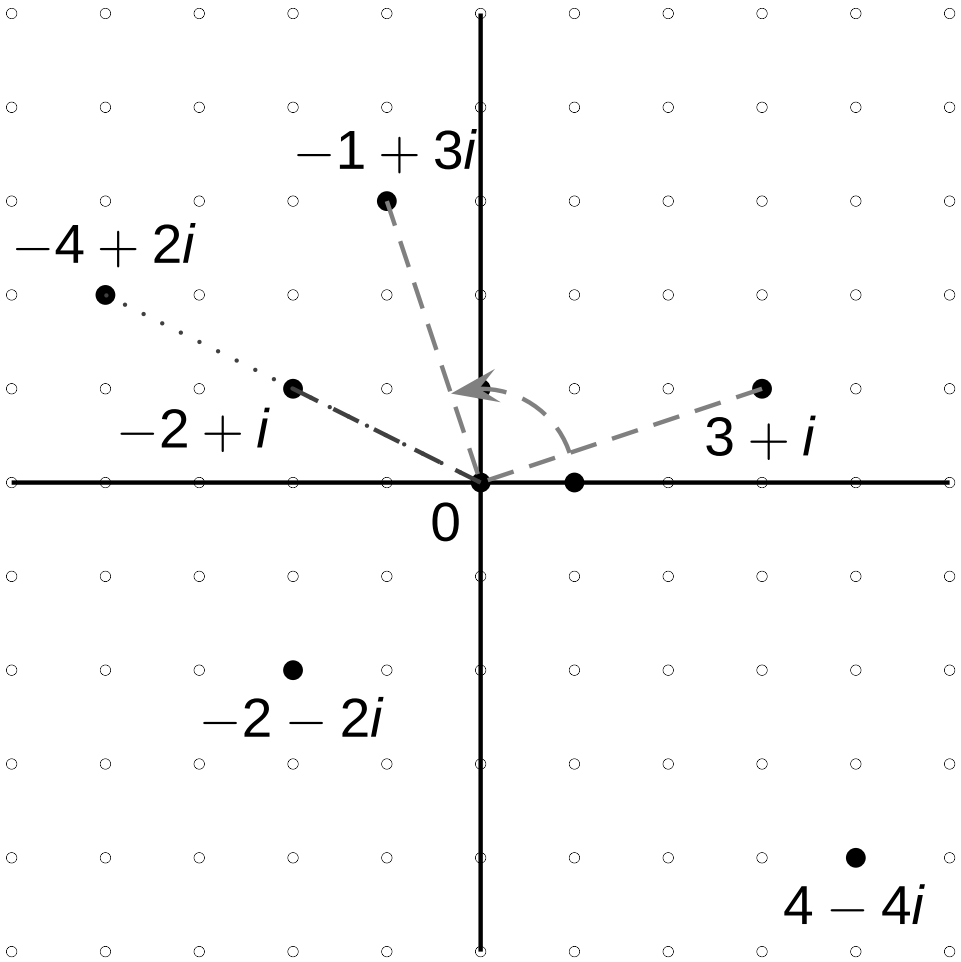

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