



## Definition

Consider two  $n \times n$  matrices  $A$  and  $B$ . We say that  $A$  is similar to  $B$  if there exists an invertible matrix  $S$  such that:

$$AS = SB, \text{ or } B = S^{-1}AS$$



## Problem

is matrix  $A = \begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$  similar to  $B = \begin{pmatrix} 5 & 0 \\ 0 & -1 \end{pmatrix}$ ?



## Solution

We want to find the matrix:

$$S = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \text{ such that } AS = BS \text{ or just } \begin{pmatrix} a + 2c & b + 2d \\ 4a + 3c & 4b + 3d \end{pmatrix} = \begin{pmatrix} 5a & -b \\ 5c & -d \end{pmatrix} \Rightarrow c = 2a, d = -b$$

$$\text{so } S = \begin{pmatrix} a & b \\ 2a & -b \end{pmatrix}$$



### Problem

Compute  $(2 - 5i)\left(\frac{i}{2} - 2\right) - i + 4$

Compute  $\frac{-2 + 2i}{-1 - 2i}$  and then try to plot it



### Solution

$$(2 - 5i)\left(\frac{i}{2} - 2\right) - i + 4 = \left(i - 4 - \frac{5i^2}{2} + 10i\right) - i + 4 = \frac{5}{2} + 10i$$

$$\frac{-2 + 2i}{-1 - 2i} \times \frac{-1 + 2i}{-1 + 2i} = \frac{2 - 4i - 2i + 4i^2}{1 - 4i^2} = \frac{-2 - 6i}{5}$$

