The Basics

Itthi Chatnuntawech
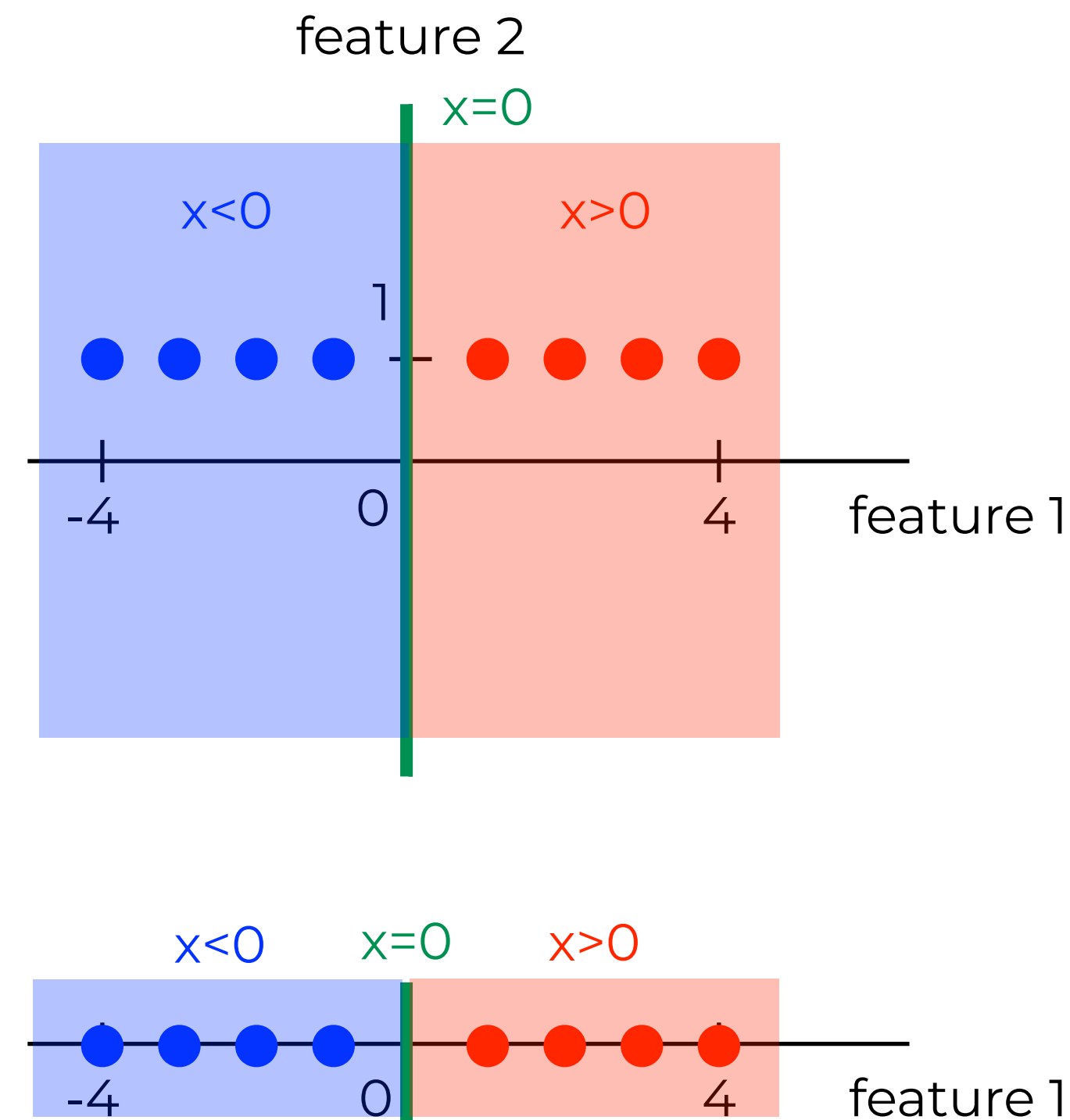
A Simple Classification Example

	feature 1	feature 2
sample 1	-4	1
sample 2	-3	1
sample 3	-2	1
sample 4	-1	1
sample 5	1	1
sample 6	2	1
sample 7	3	1
sample 8	4	1

A Simple Classification Example

	feature 1	feature 2
sample 1	-4	1
sample 2	-3	1
sample 3	-2	1
sample 4	-1	1
sample 5	1	1
sample 6	2	1
sample 7	3	1
sample 8	4	1

A Simple Classification Example

	feature 1	feature 2
sample 1	-2	2
sample 2	-1	2
sample 3	0	2
sample 4	1	2
sample 5	3	2
sample 6	4	2
sample 7	5	2
sample 8	6	2

Translate down by 2 units and left by 2 units

A Simple Classification Example
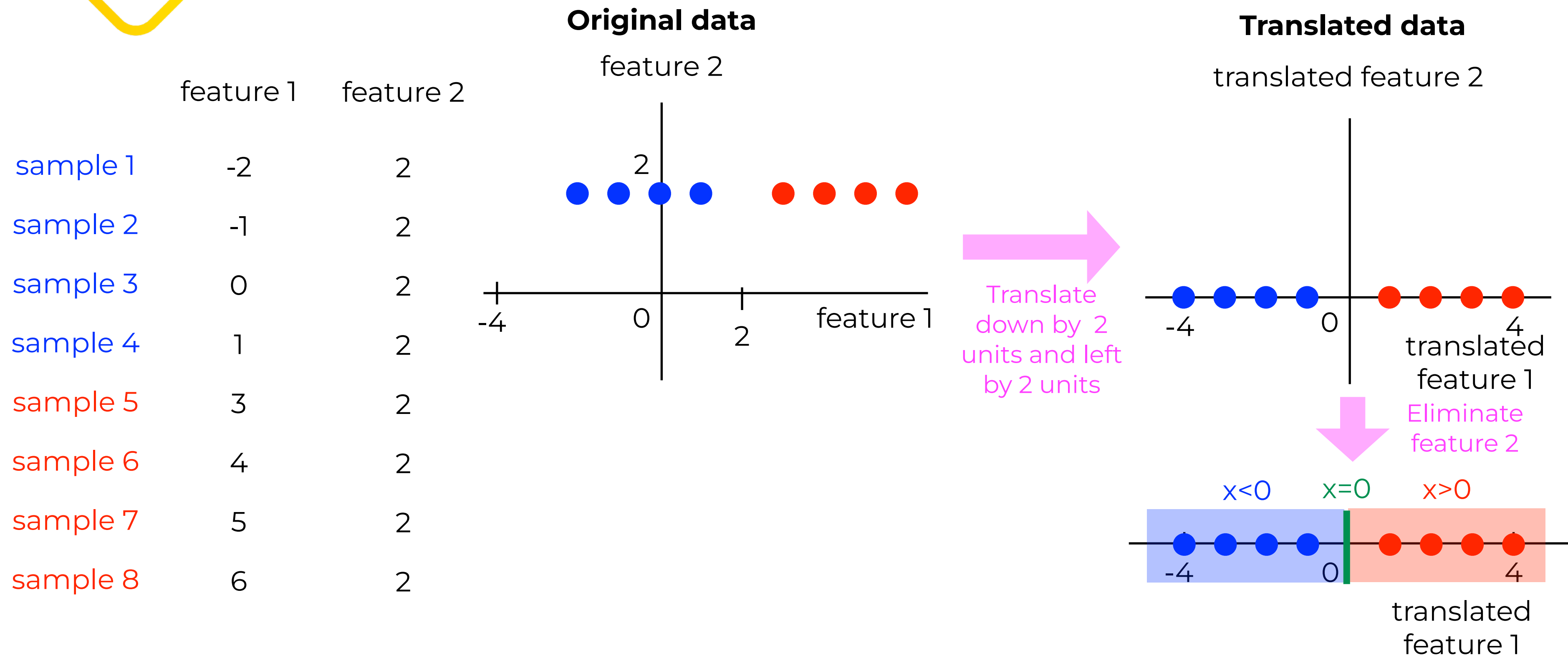
Original data

	feature 1	feature 2
sample 1	-2	2
sample 2	-1	2
sample 3	0	2
sample 4	1	2
sample 5	3	2
sample 6	4	2
sample 7	5	2
sample 8	6	2

Translate down by 2 units and left by 2 units

Translated data

Eliminate feature 2

$x<0$ $x=0$ $x>0$

A Simple Classification Example

Original data

	feature 1	feature 2
sample 1	-4	-4
sample 2	-3	-3
sample 3	-2	-2
sample 4	-1	-1
sample 5	1	1
sample 6	2	2
sample 7	3	3
sample 8	4	4

feature 2

x+y=0

x+y>0

x+y<0

feature 1

A Simple Classification Example

	feature 1	feature 2
sample 1	-4	-4
sample 2	-3	-3
sample 3	-2	-2
sample 4	-1	-1
sample 5	1	1
sample 6	2	2
sample 7	3	3
sample 8	4	4

Original data

feature 2

$x+y=0$

$x+y>0$

$x+y<0$

feature 1

Rotated data

feature 2

feature 1

A Simple Classification Example

Original data

	feature 1	feature 2
sample 1	-4	-4
sample 2	-3	-3
sample 3	-2	-2
sample 4	-1	-1
sample 5	1	1
sample 6	2	2
sample 7	3	3
sample 8	4	4

feature 2

x+y=0

x+y>0

x+y<0

feature 1

x'<0   x'=0   x'>0
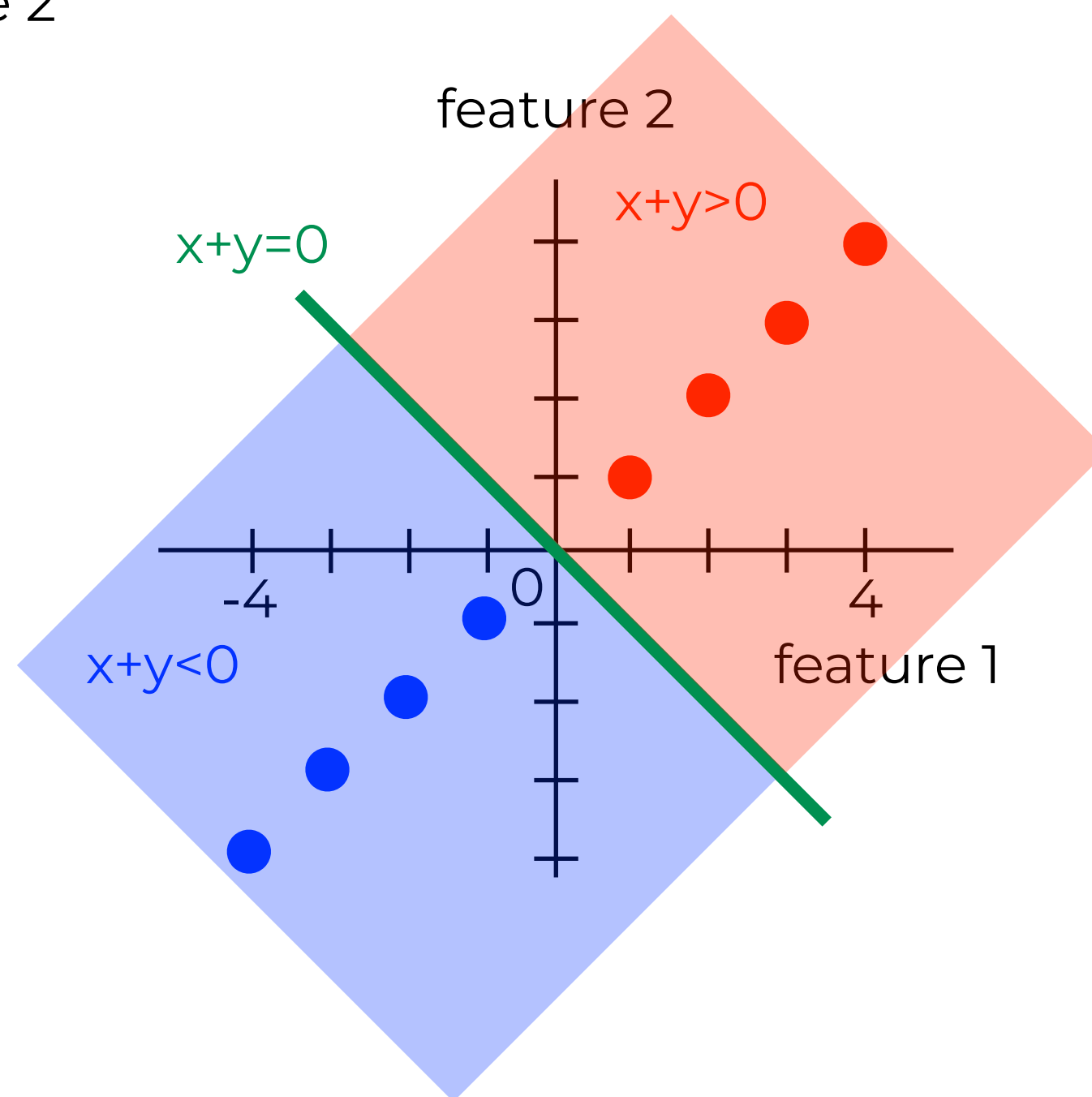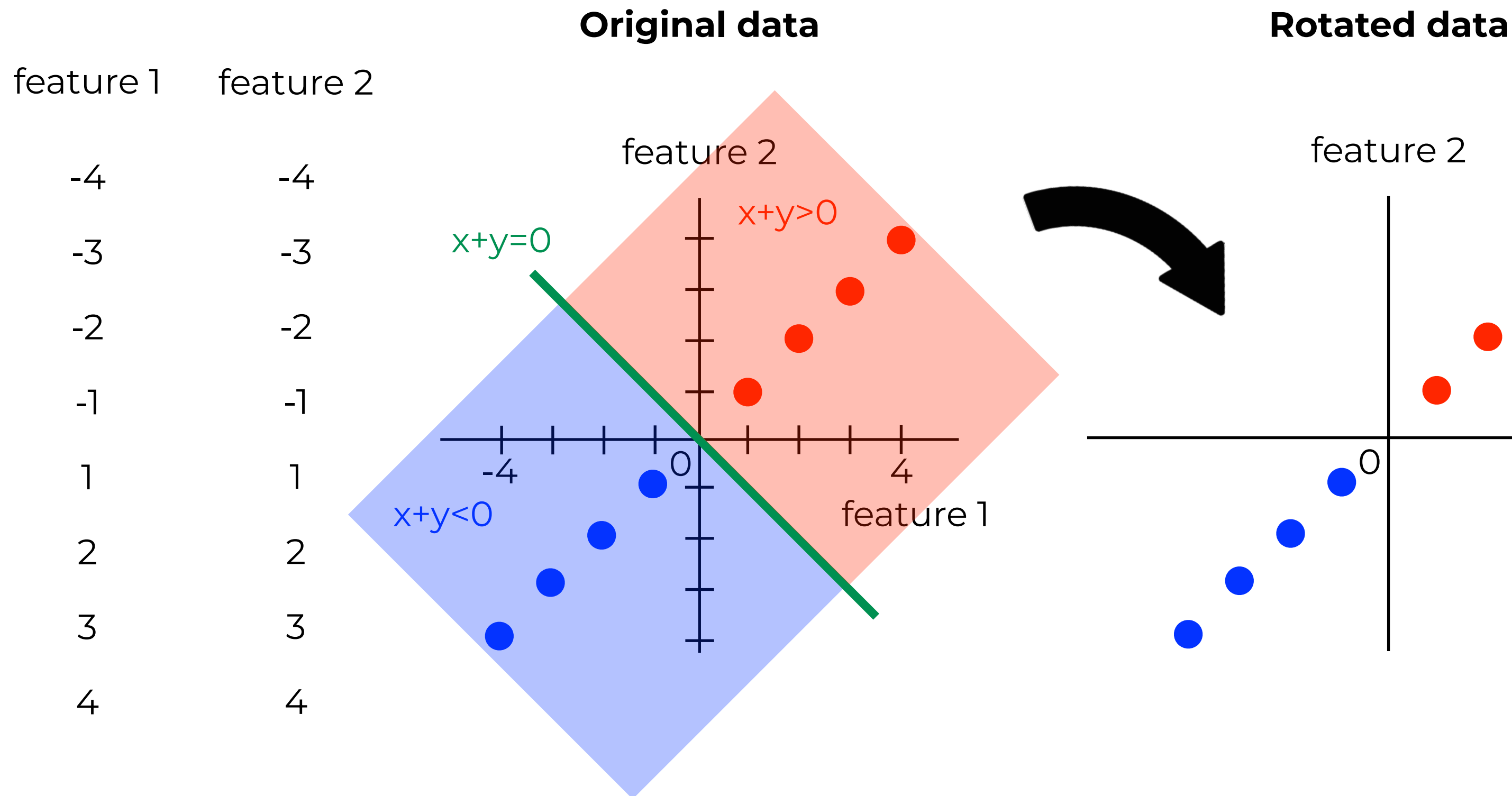
rotated feature
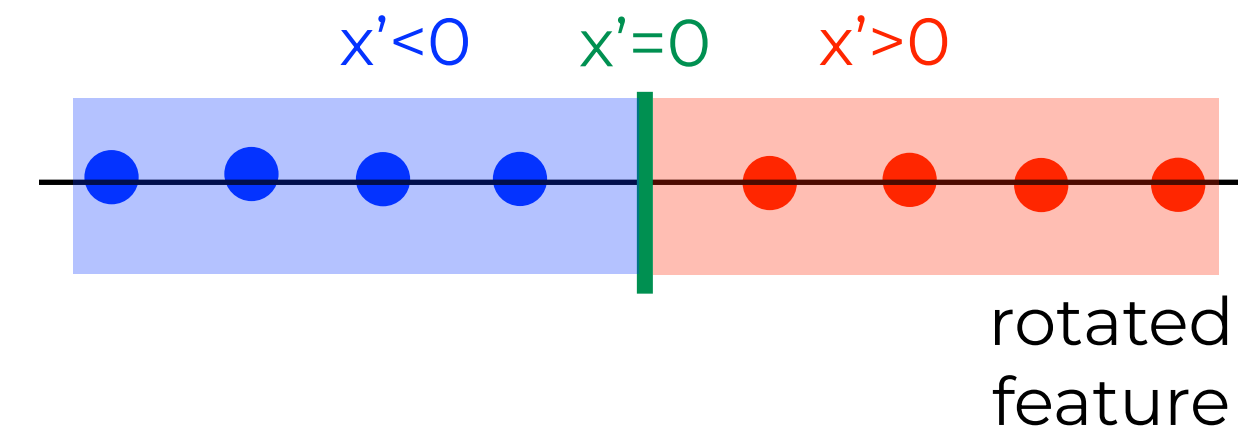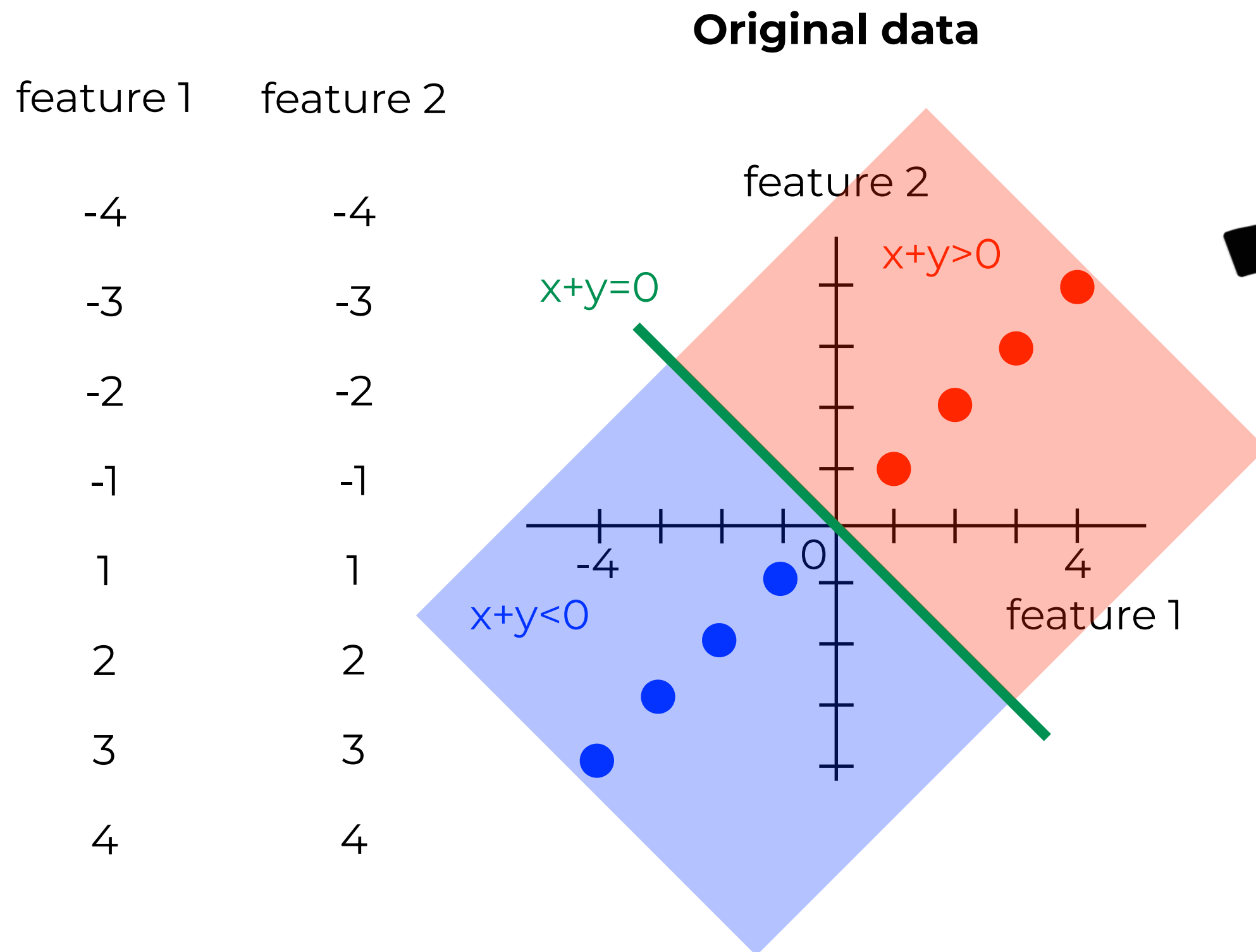
How many features do we need to classify a point?

A Simple Classification Example

Original data

	feature 1	feature 2
sample 1	-4	-4
sample 2	-3	-3
sample 3	-2	-2
sample 4	-1	-1
sample 5	1	1
sample 6	2	2
sample 7	3	3
sample 8	4	4

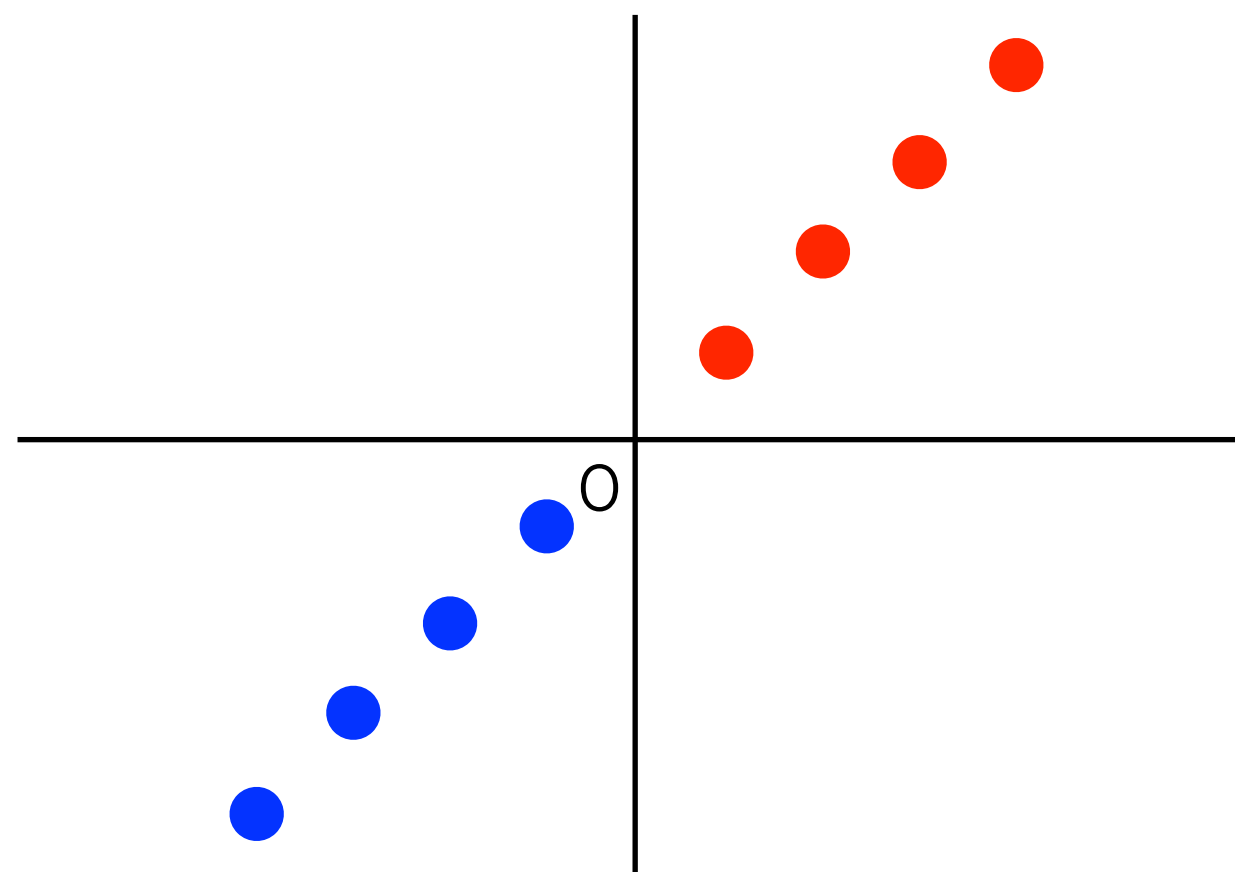feature 2

x<0   x=0   x>0

-4   0   4
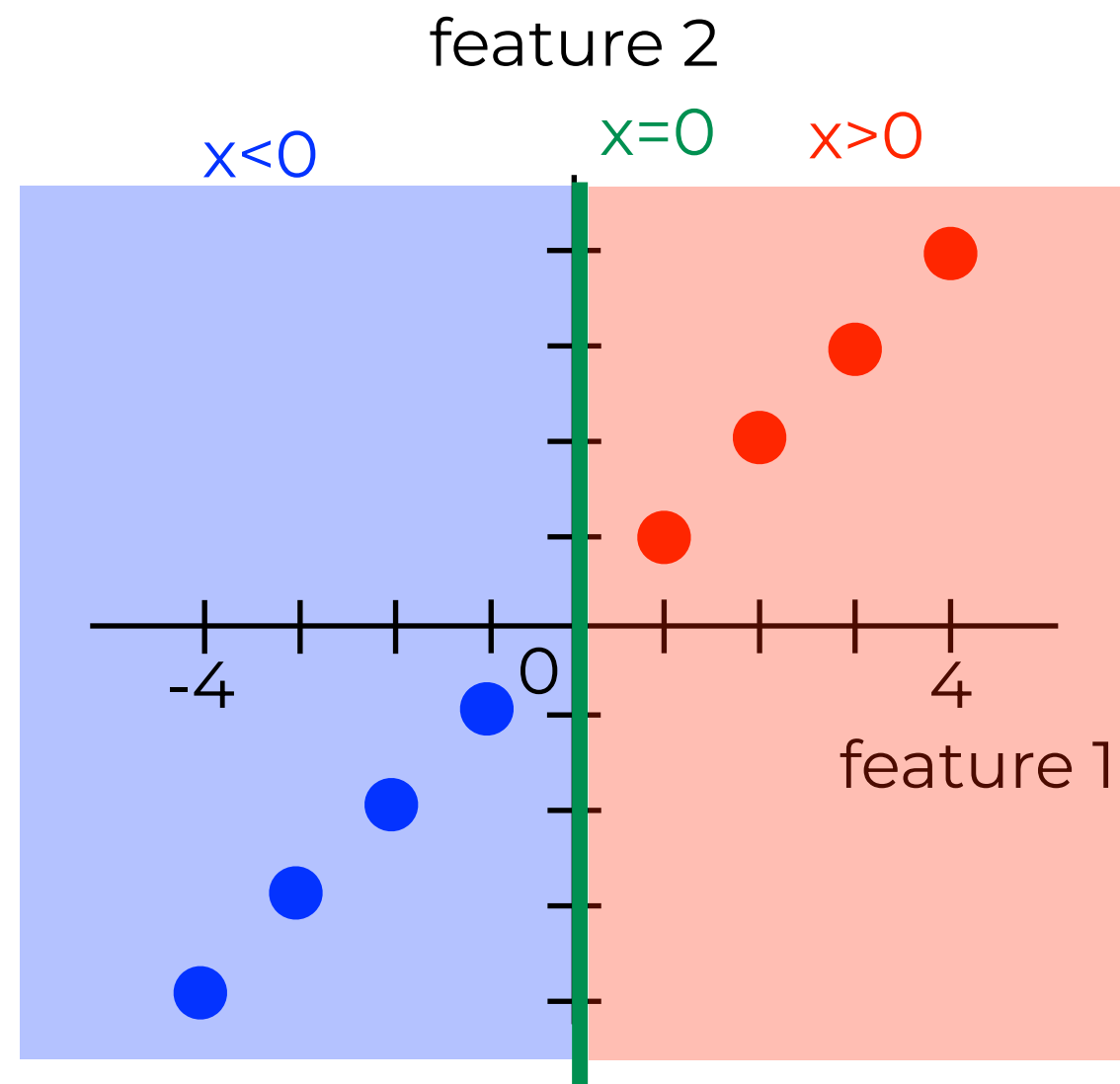
feature 1

Why don't we just throw away feature 2 without rotating our data?

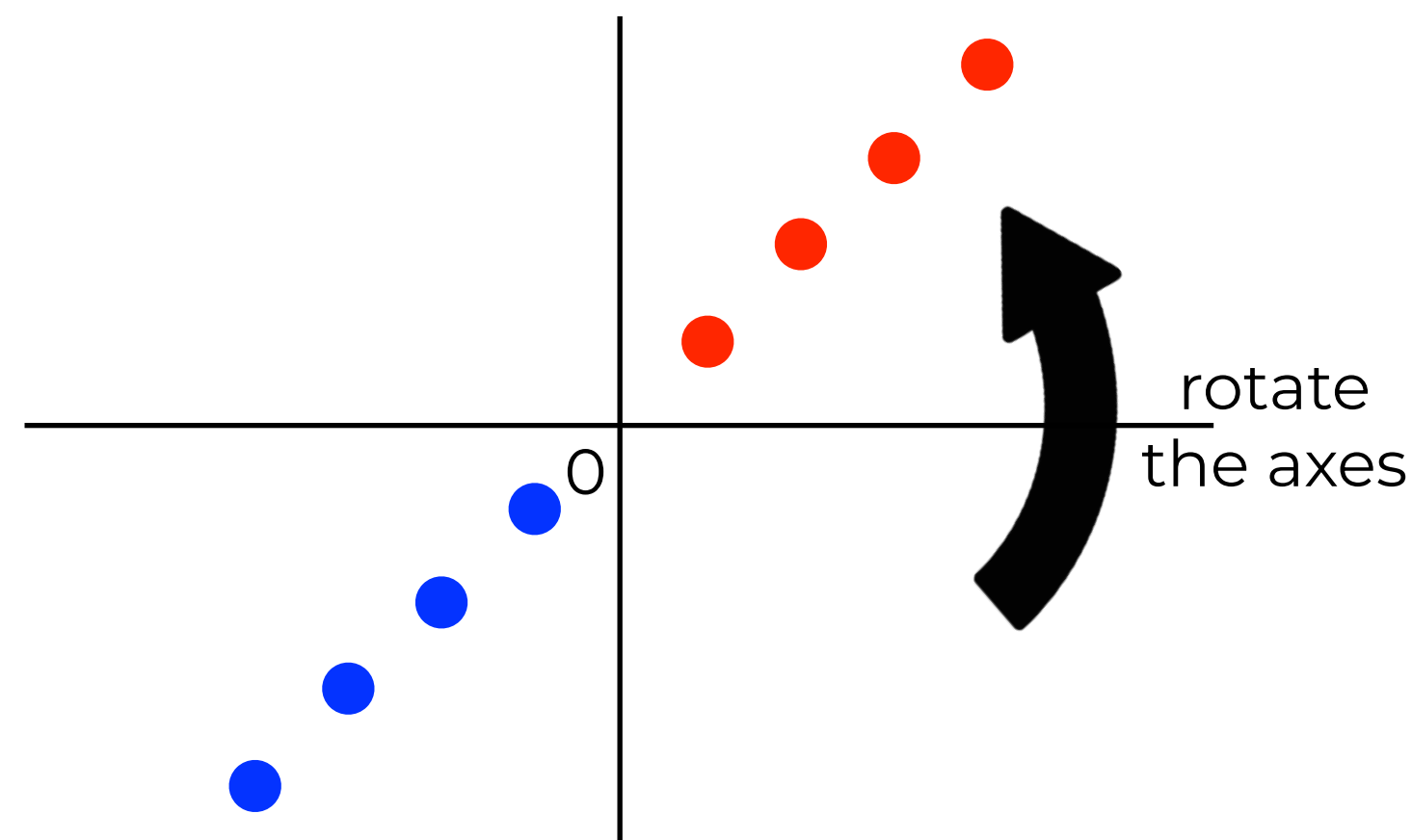# Rotating the Axes or the Data

Original data
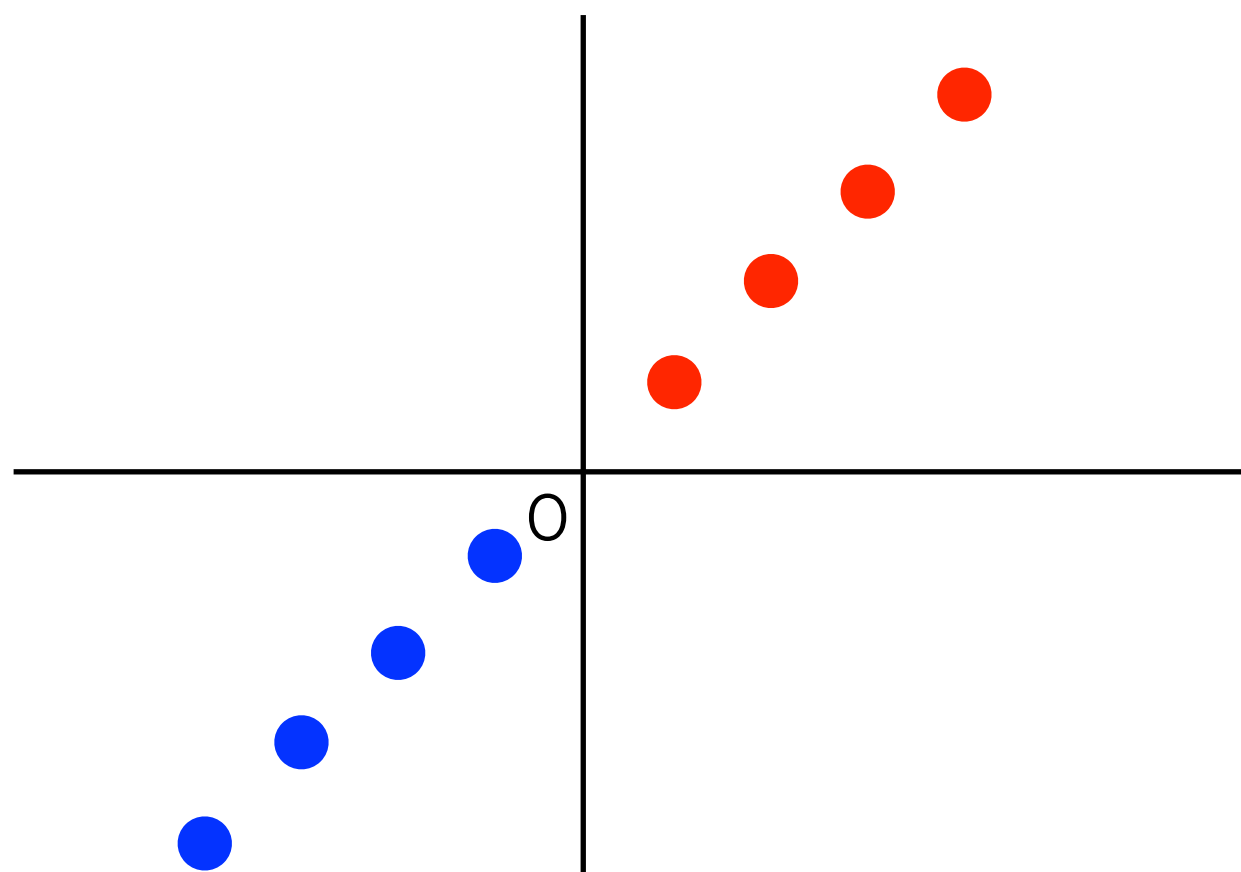
Original data

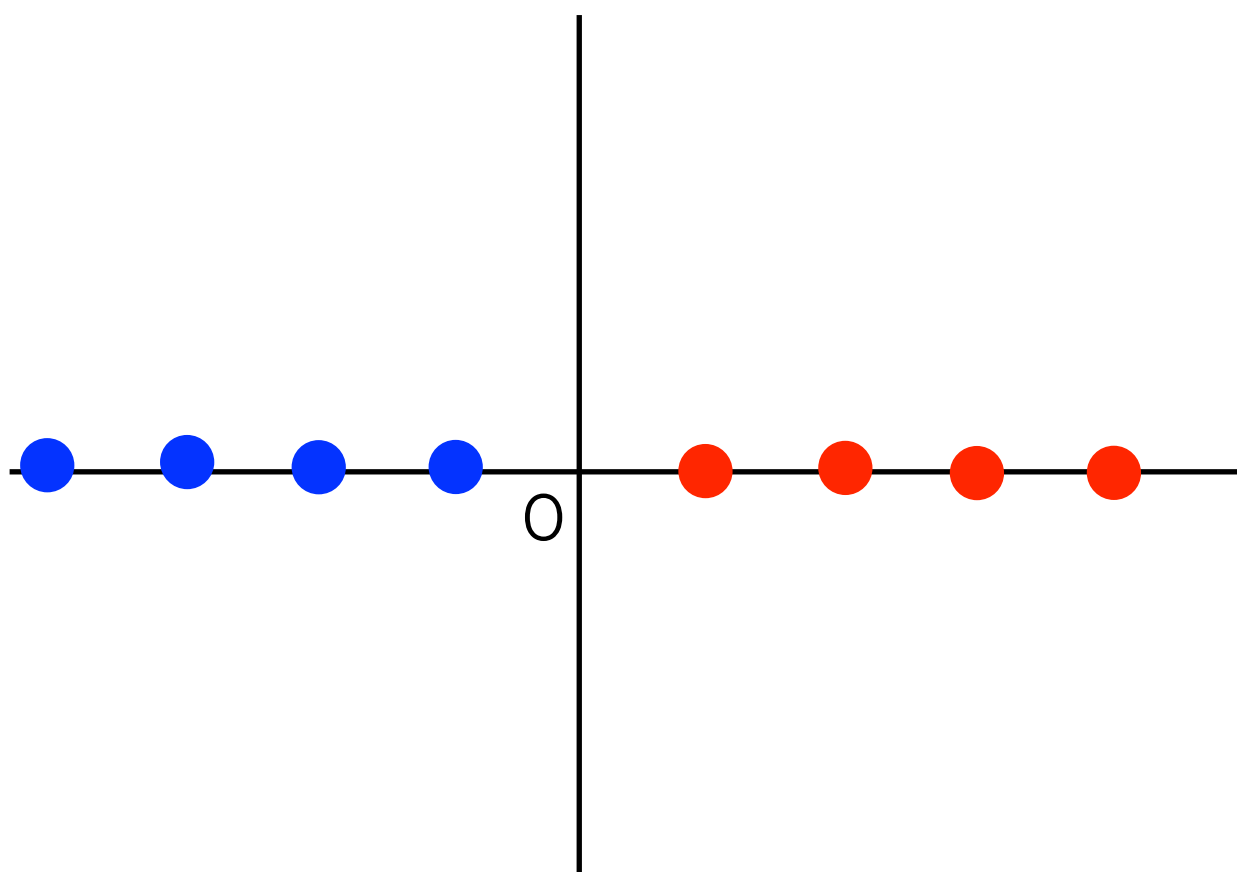# Rotating the Axes or the Data

Rotated data by 45 degrees clockwise

Rotated the axes by 45 degrees counterclockwise
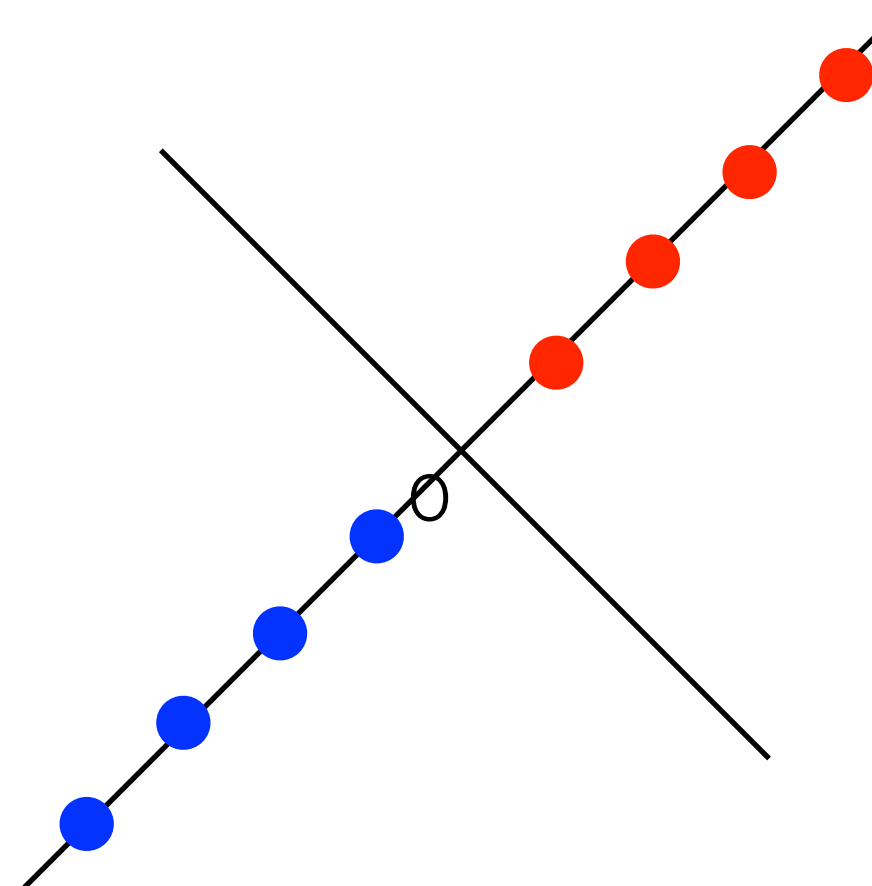

rotate the data

0

rotate the axes

0

Rotating the Axes or the Data
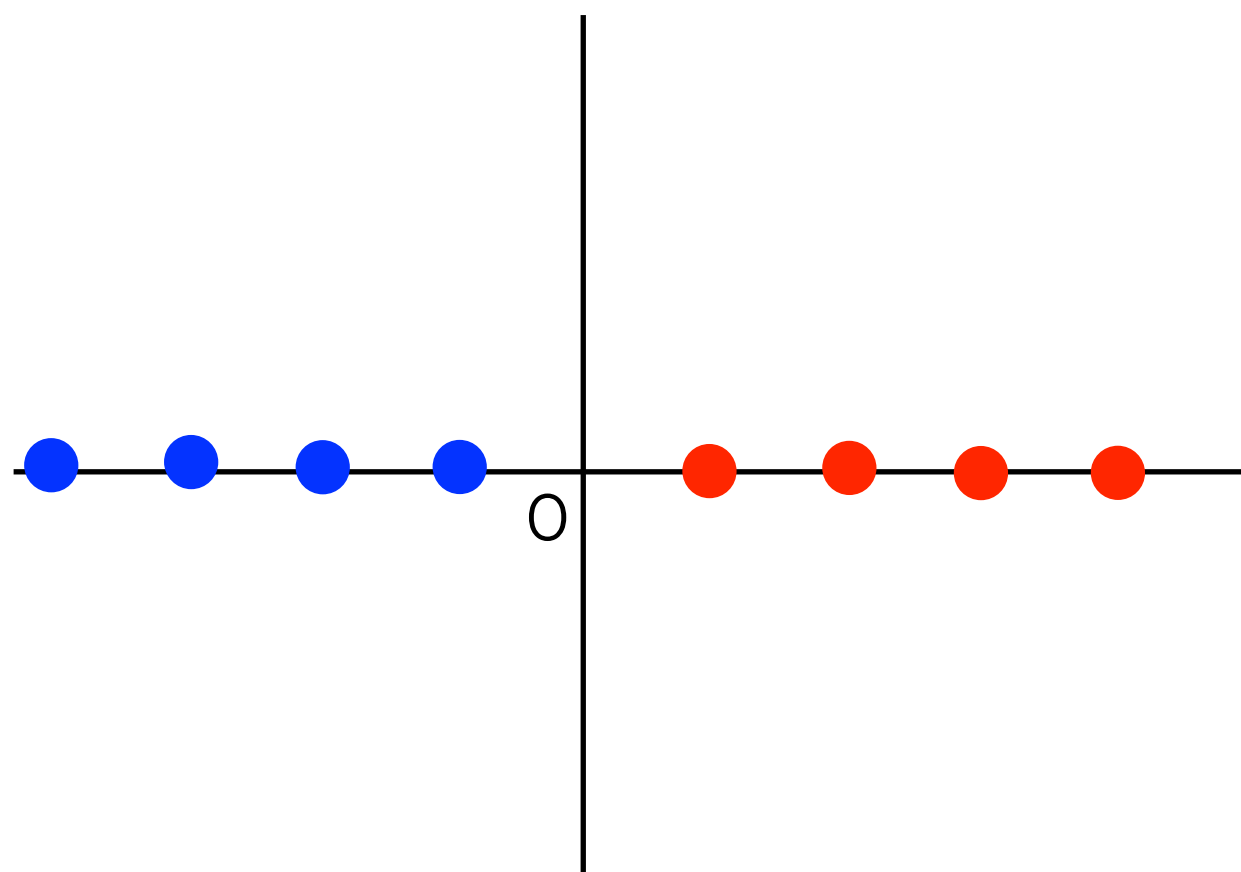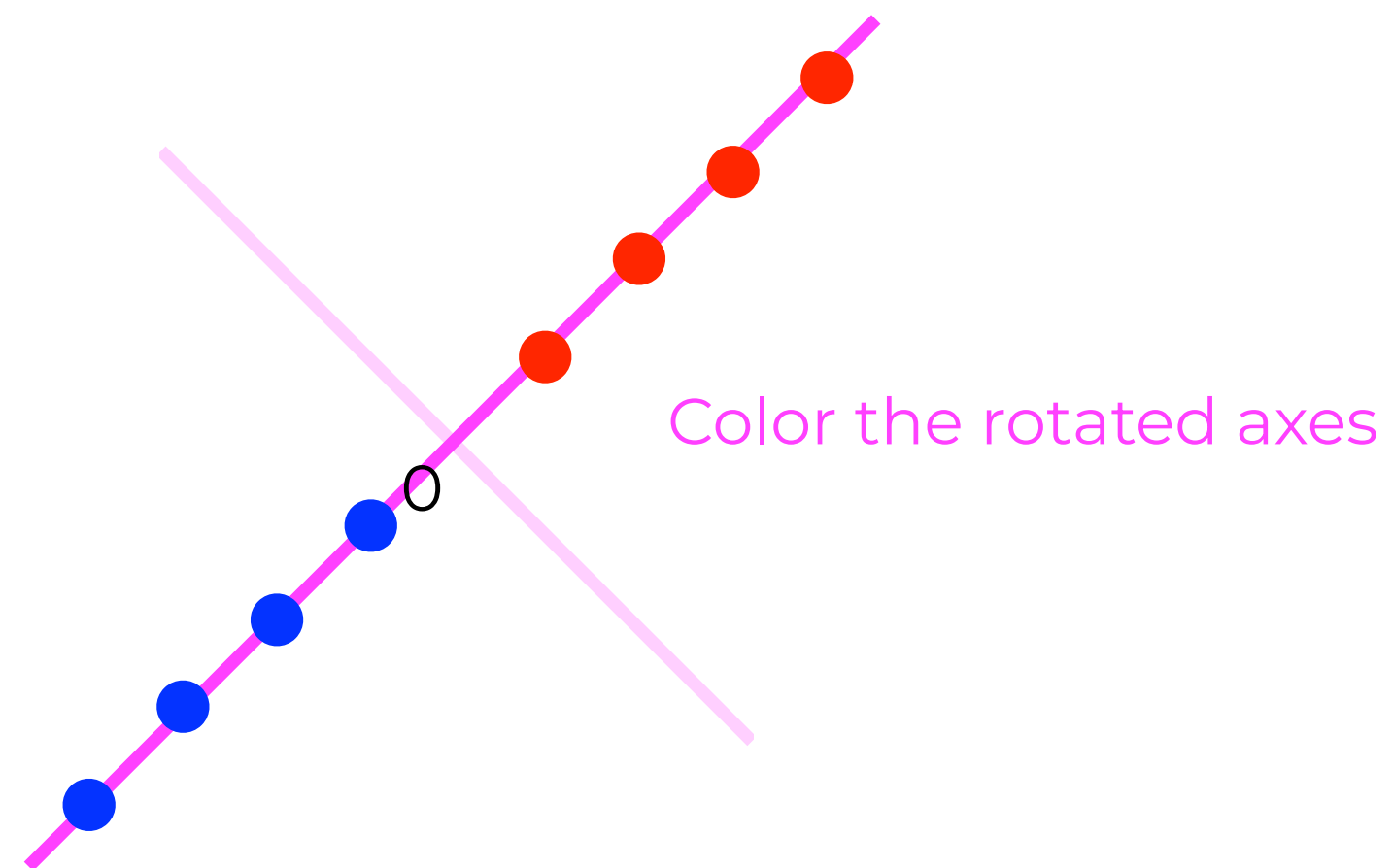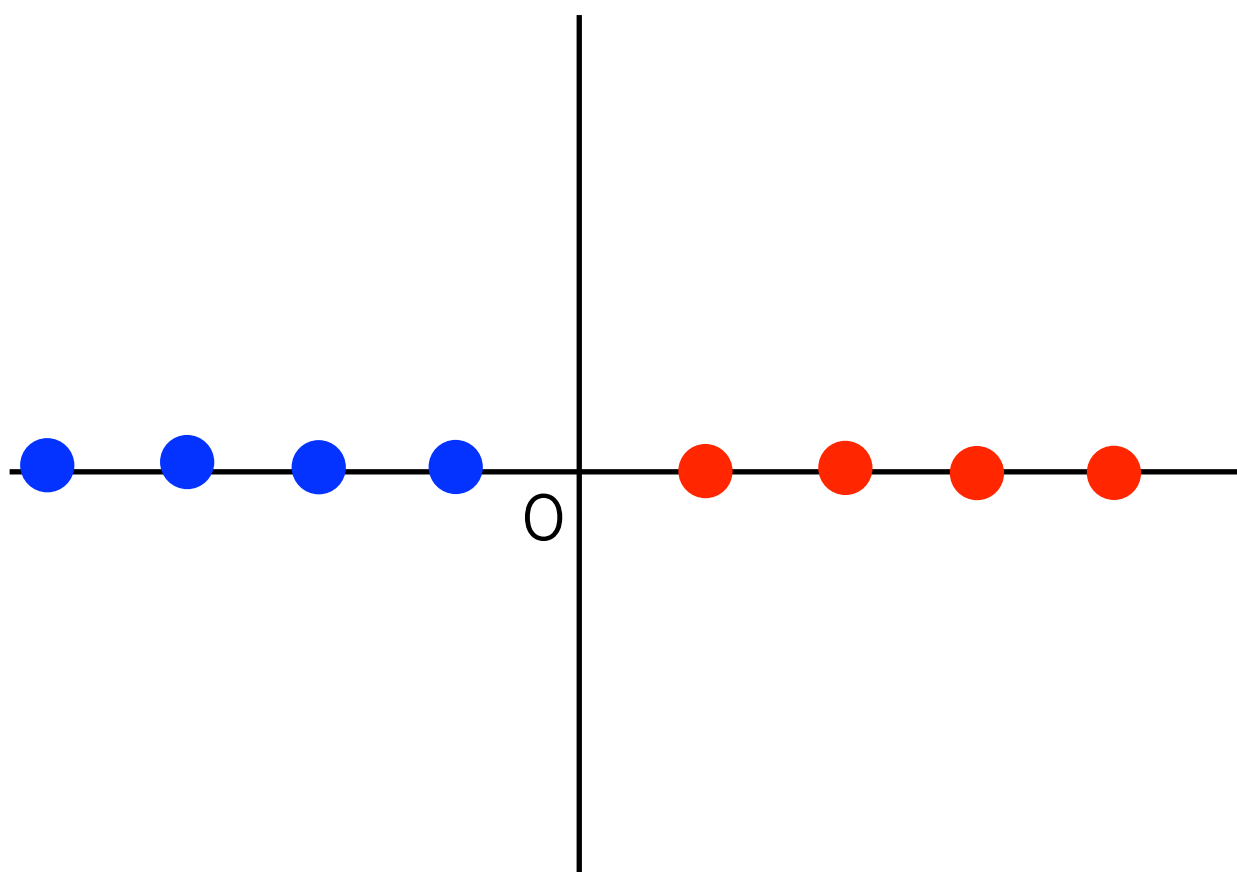
Rotated data by 45 degrees clockwise

Rotated the axes by 45 degrees counterclockwise

Rotating the Axes or the Data

Rotated data by 45 degrees clockwise

Rotated the axes by 45 degrees counterclockwise

Color the rotated axes

Rotating the Axes or the Data

Rotated data by 45 degrees clockwise

Rotated the axes by 45 degrees counterclockwise and tilt your head by 45 degrees