Intervals

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Some authors use different notation, for instance $(a, b]$ or $(a, b\rangle$ in the second case. We will use the above notation, as it is also used by the IB.

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$]-\infty, b[$ denotes all x such that $x < b$

Note that we never include ∞ (or $-\infty$) as it is not a number.

Remember that intervals are just sets of numbers (often infinite), so all the operations on sets can be used. We will practice those operations on the next slides.

Example 1

Let:

$$A =]1, 4] \qquad B =]-\infty, 3[$$

Find $A \cup B$, $A \cap B$, $A - B$ oraz $B - A$.

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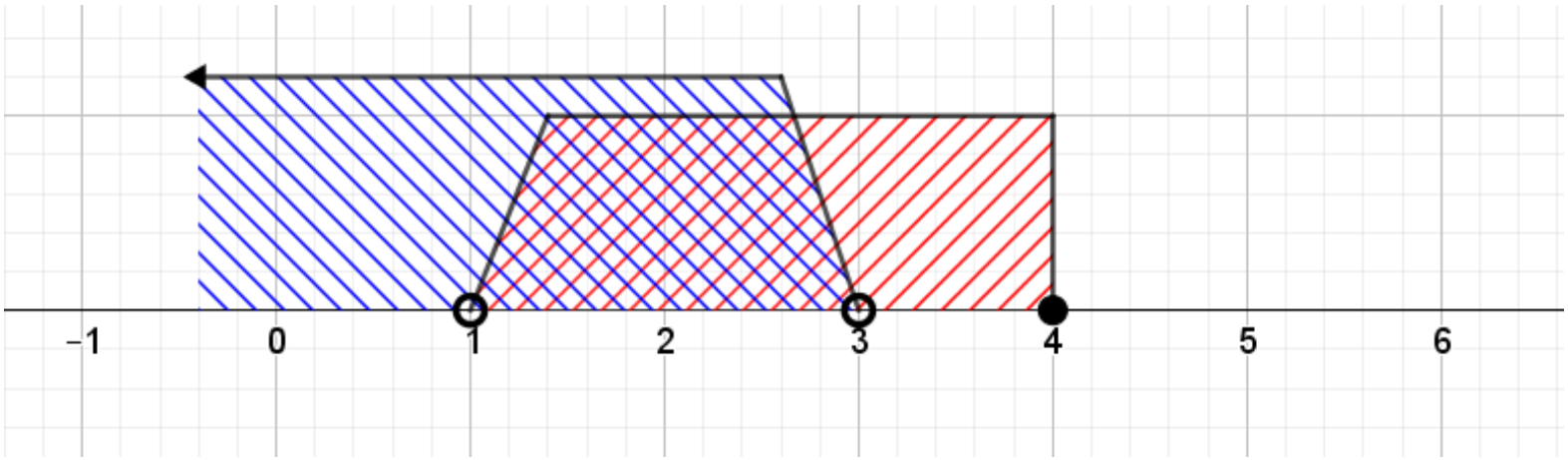
Find $A \cup B$, $A \cap B$, $A - B$ oraz $B - A$.

It is often helpful to mark both sets on a number line:

Example 1

$$A =]1, 4] \qquad B =]-\infty, 3[$$

A is marked with red, B with blue.



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- $A \cap B$ is the intersection, so it is the part coloured by both colours.
- $A - B$ is the difference between A and B, so it is the part coloured **only** in red.
- $B - A$ is the difference between B and A, so it is the part coloured **only** in blue.

Example 1

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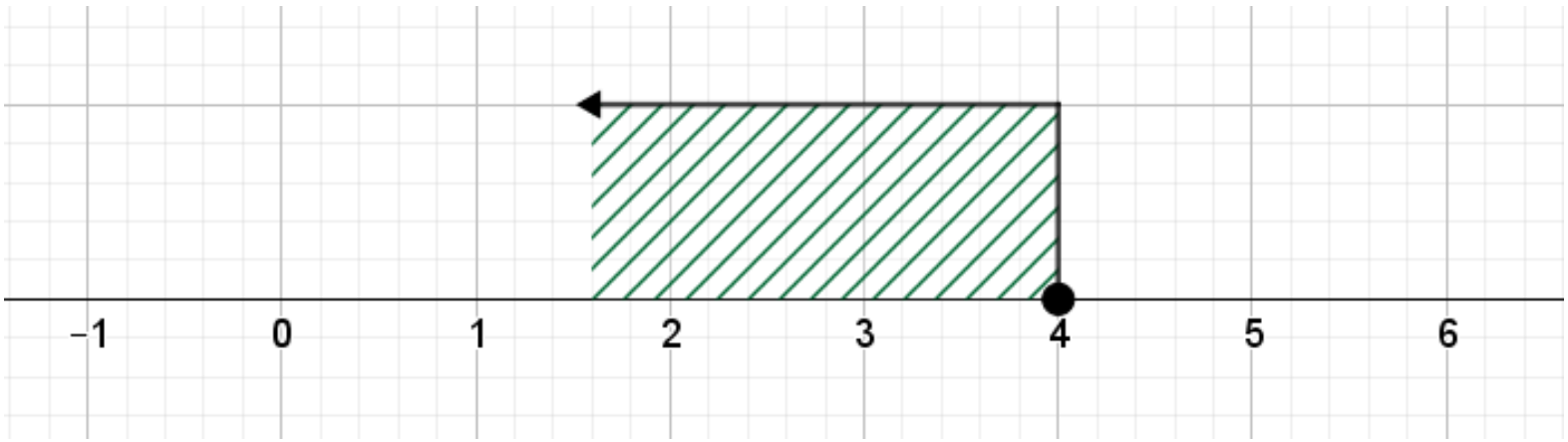

Example 1

$$A \cap B =]1, 3[$$

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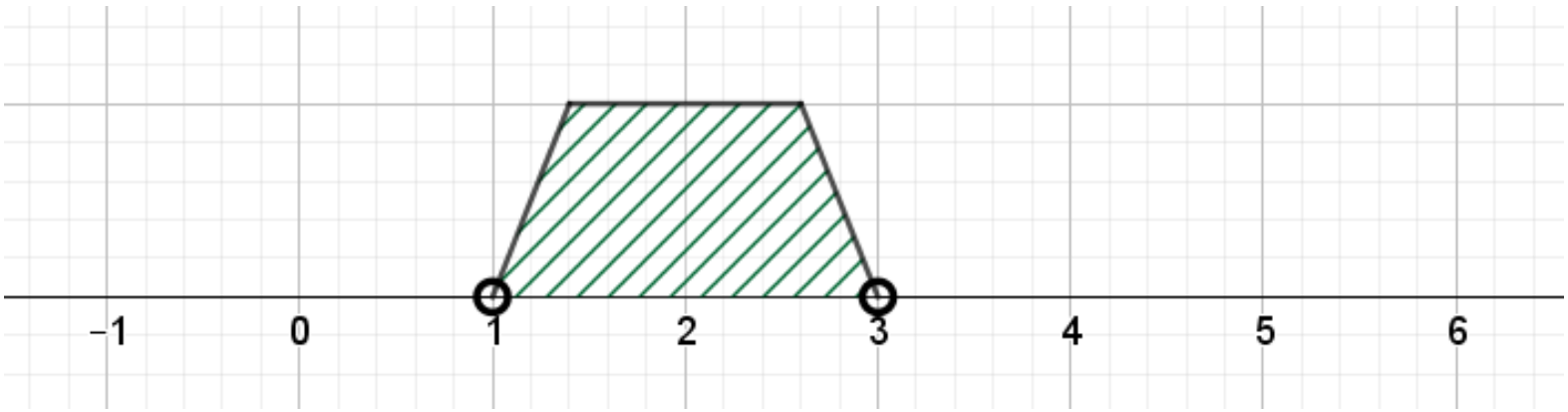

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$$A - B = [3, 4]$$

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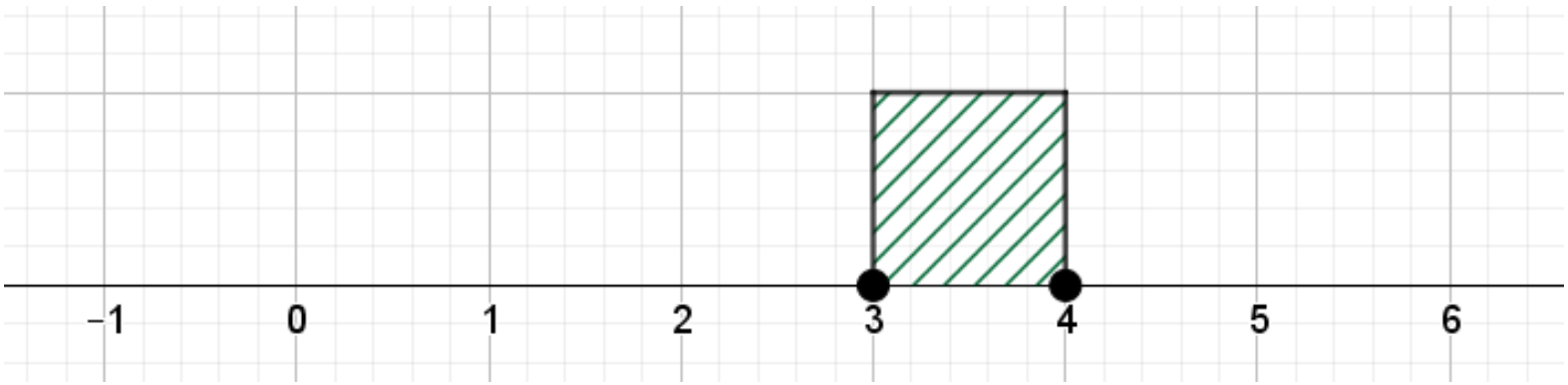

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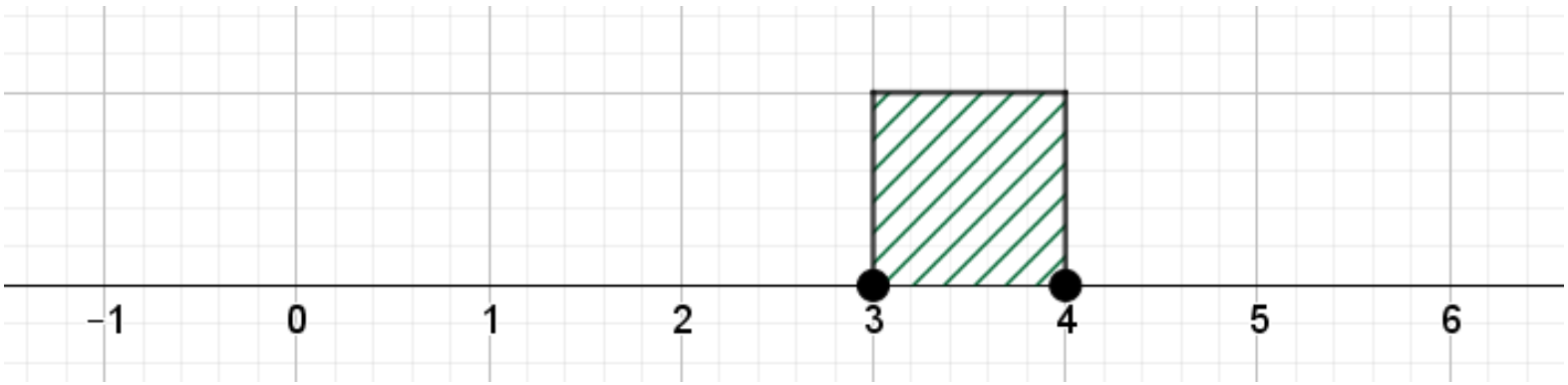

Why is 3 in this set?

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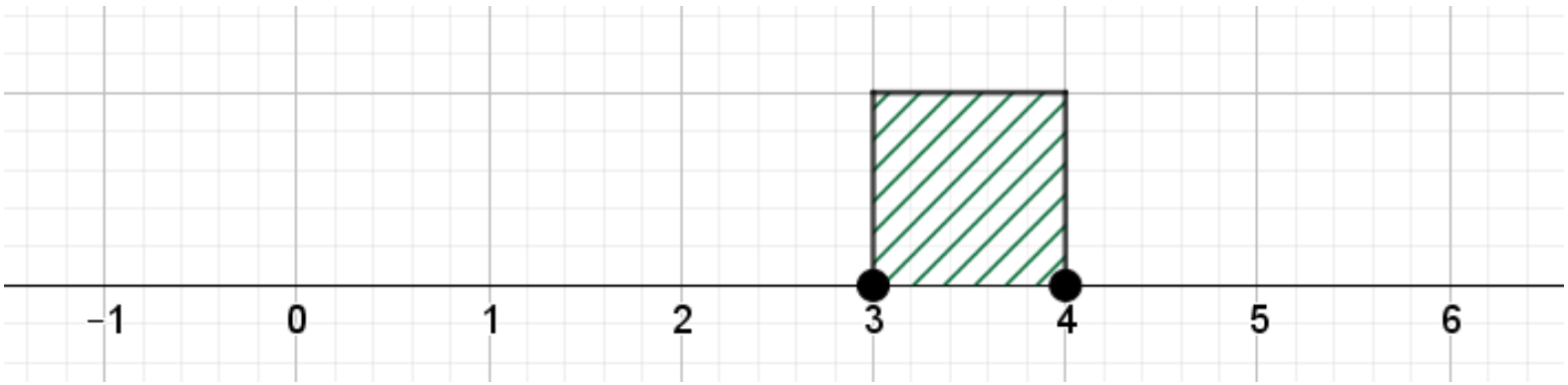

Why is 3 in this set? 3 belongs to $A - B$, since it belongs to A and doesn't belong to B. $B =]-\infty, 3[$, so 3 is outside of B.

Example 1

$$B - A =]-\infty, 1]$$

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Example 2

Let:

$$A =]0, 5] \qquad B = [1, 3[$$

Find $A \cup B$, $A \cap B$, $A - B$ oraz $B - A$.

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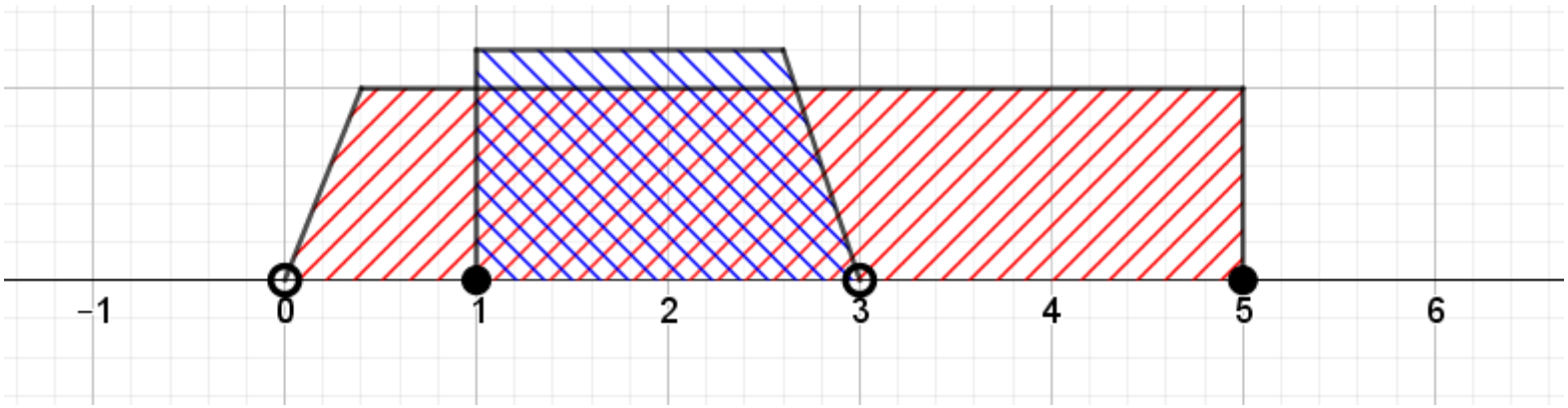
$$A =]0, 5] \qquad B = [1, 3[$$

Find $A \cup B$, $A \cap B$, $A - B$ oraz $B - A$.

Again it is useful to mark the sets on the number line.

Example 2



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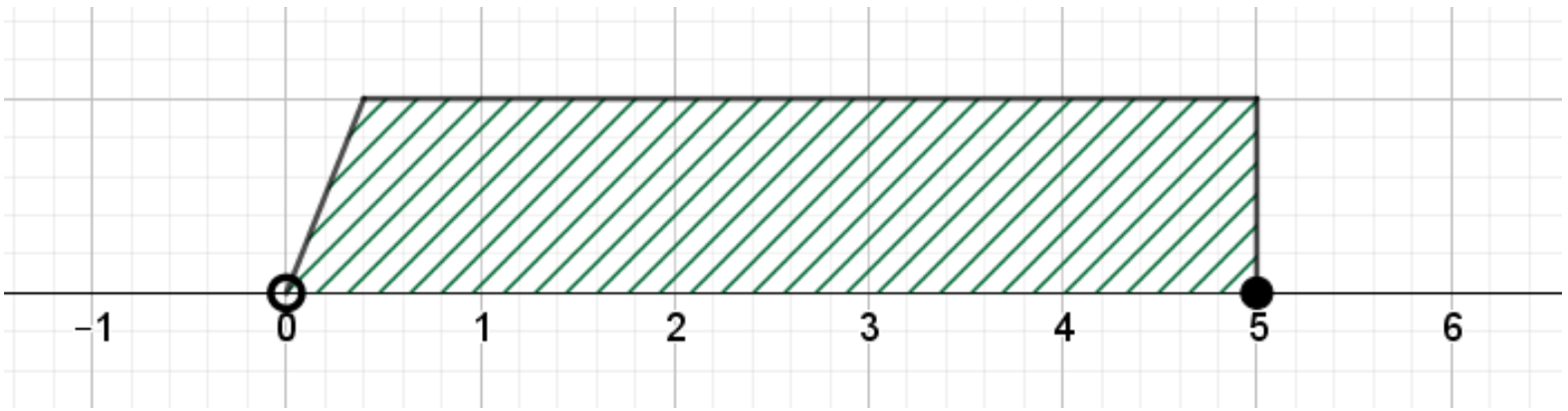

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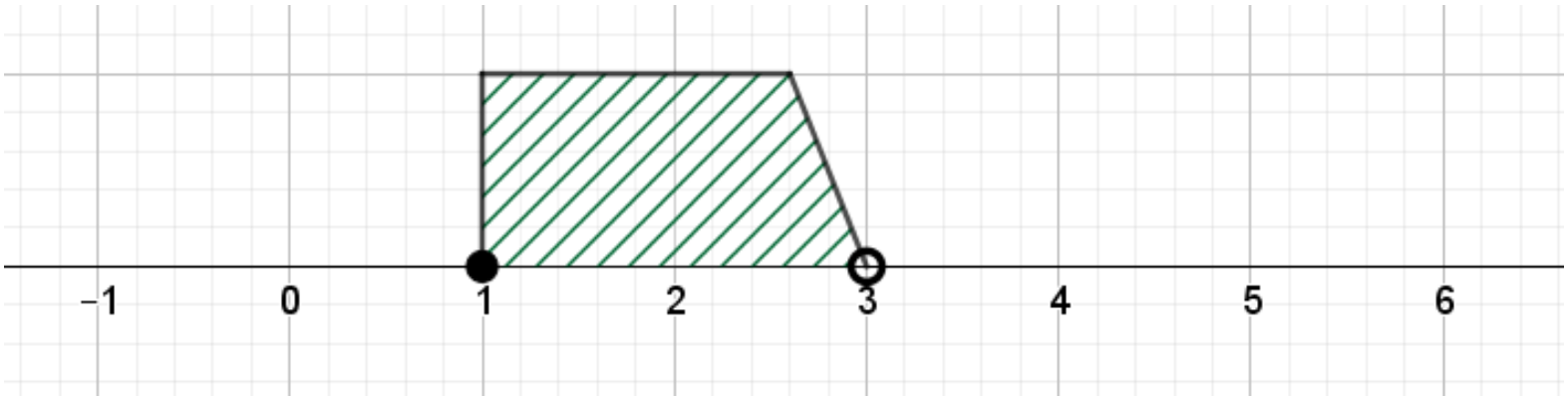

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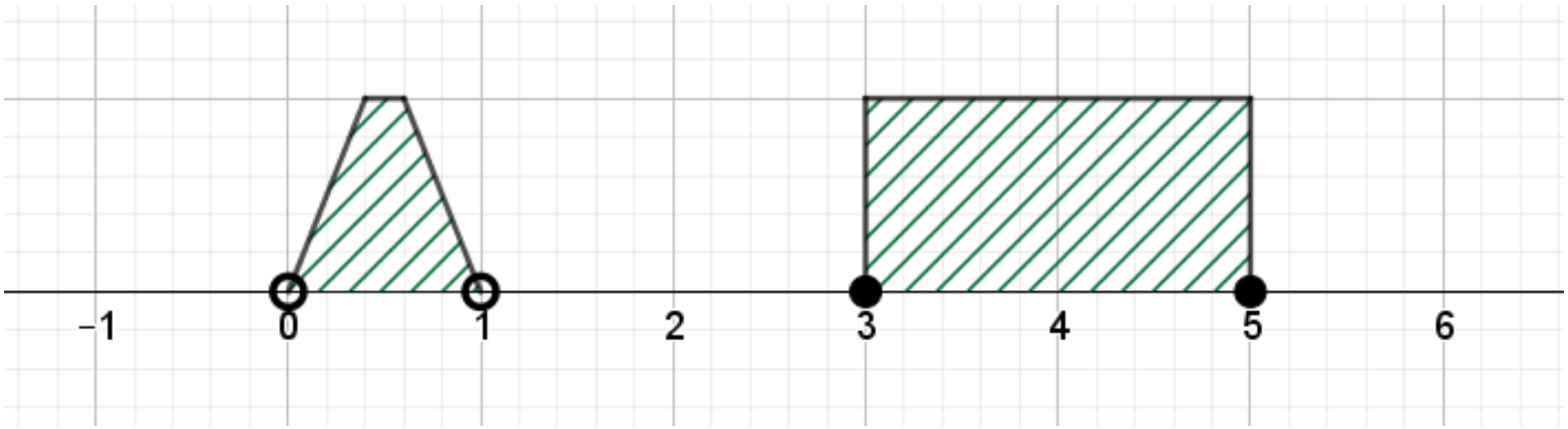


Example 2

$$B - A = \emptyset$$

Example 3

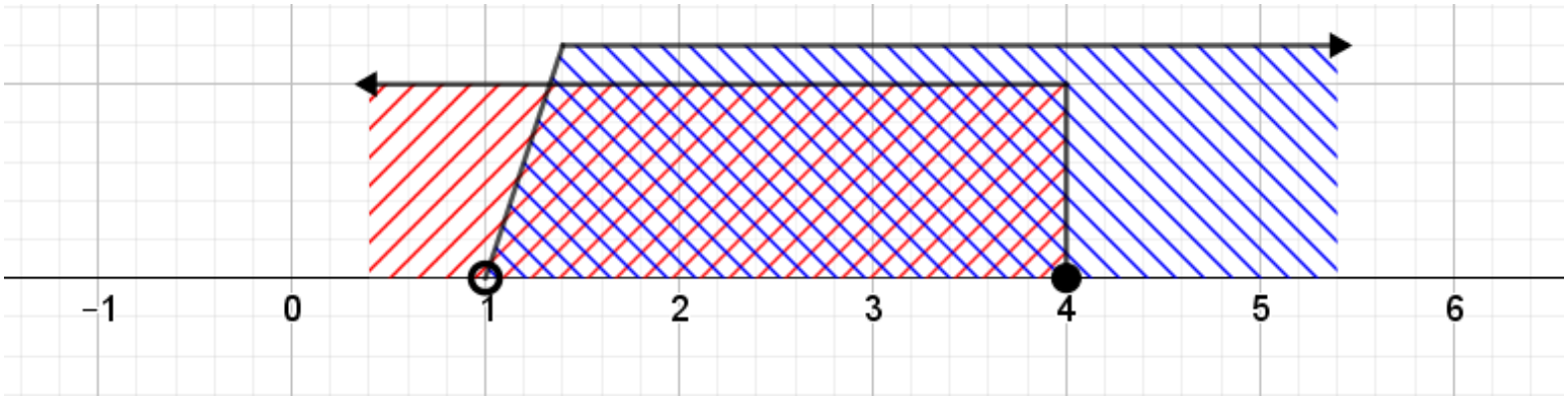
Let:

$$A =]-\infty, 4] \qquad B =]1, \infty[$$

Find the sets A', B'.

Example 3

We will use red for A and blue for B:



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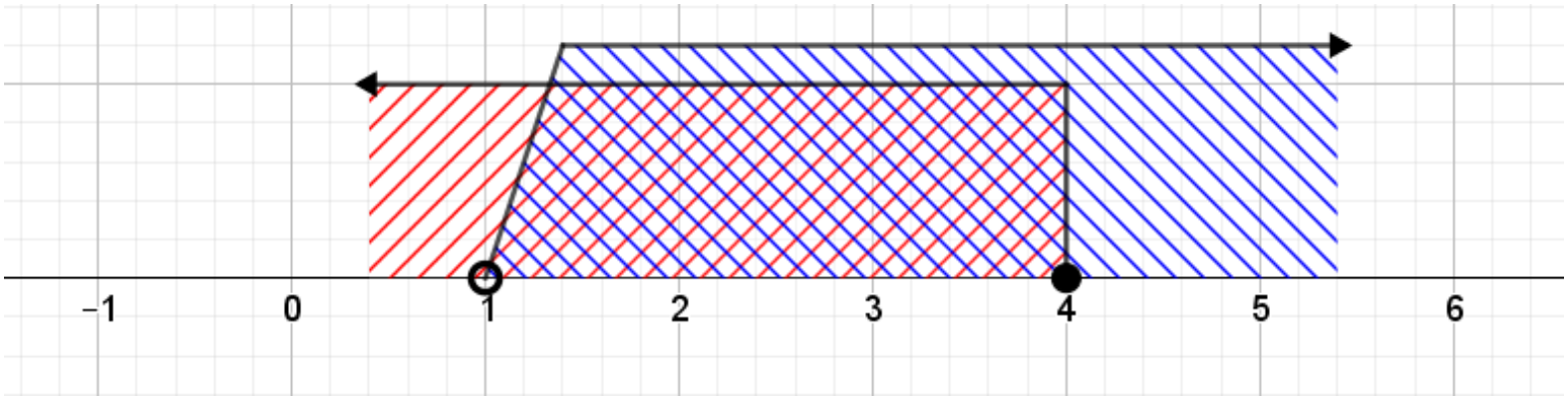

- A' is the complement of A, so it is the part **not** coloured in red.

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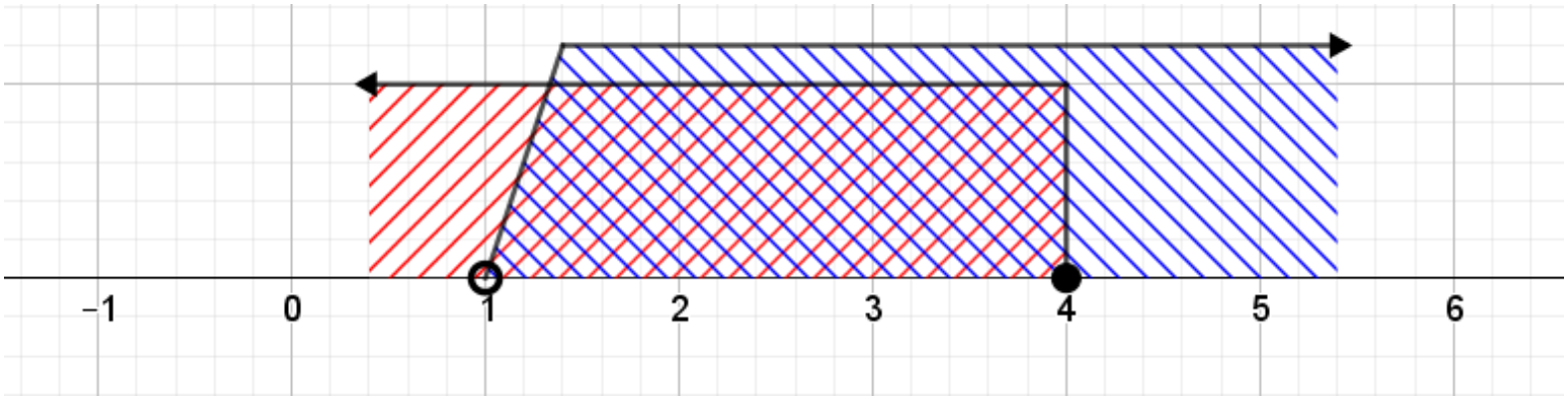

- A' is the complement of A, so it is the part **not** coloured in red.
- B' is the complement of B, so it is the part **not** coloured in blue.

Example 3

$$A' =]4, \infty[$$

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Example 3

$$B' =]-\infty, 1]$$

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If you have any questions, you can email me at T.J.Lechowski@gmail.com.