$= 0$ 

$= 0$ 

It is OK for the numerator of a fraction to equal 0; but it is bad for the denominator to equal 0 (since it is impossible to divide by 0).

<u>Finding the domain of a rational expression</u>

We are really finding the losers so we can kick them out! We will set the denominator equal to 0. The answers we get will be bad and we will not allow them to be in the domain.

Example 1A- Find the domain of $f(t) = \frac{t^2-9}{t^2-9t}$

We will set the denominator equal to 0 and solve for t.

$$t^2 - 9t = 0$$
$$t(t-9) = 0$$
$$t = 0 \quad t - 9 = 0$$
$$t = 0 \quad t = 9$$

This means we have problems when $t = 0, 9$ because both numbers turn the denominator into 0. Therefore, we will not allow them to be in the domain for this function. We can write our answer like this:

Domain: $\boldsymbol{t \neq 0, 9}$

This means that all real numbers are OK to use as inputs except 0 or 9.

<u>Finding the zeros of a rational expression</u>
We will set the numerator equal to 0. The answers we get will be the zeros of the function.

Example 1B- Find the zeros of $f(t) = \frac{t^2-9}{t^2-9t}$

We will set the numerator equal to 0 and solve for t.

$$t^2 - 9 = 0$$
$$(t+3)(t-3) = 0$$
$$t + 3 = 0 \quad t - 3 = 0$$
$$t = -3 \quad t = 3$$

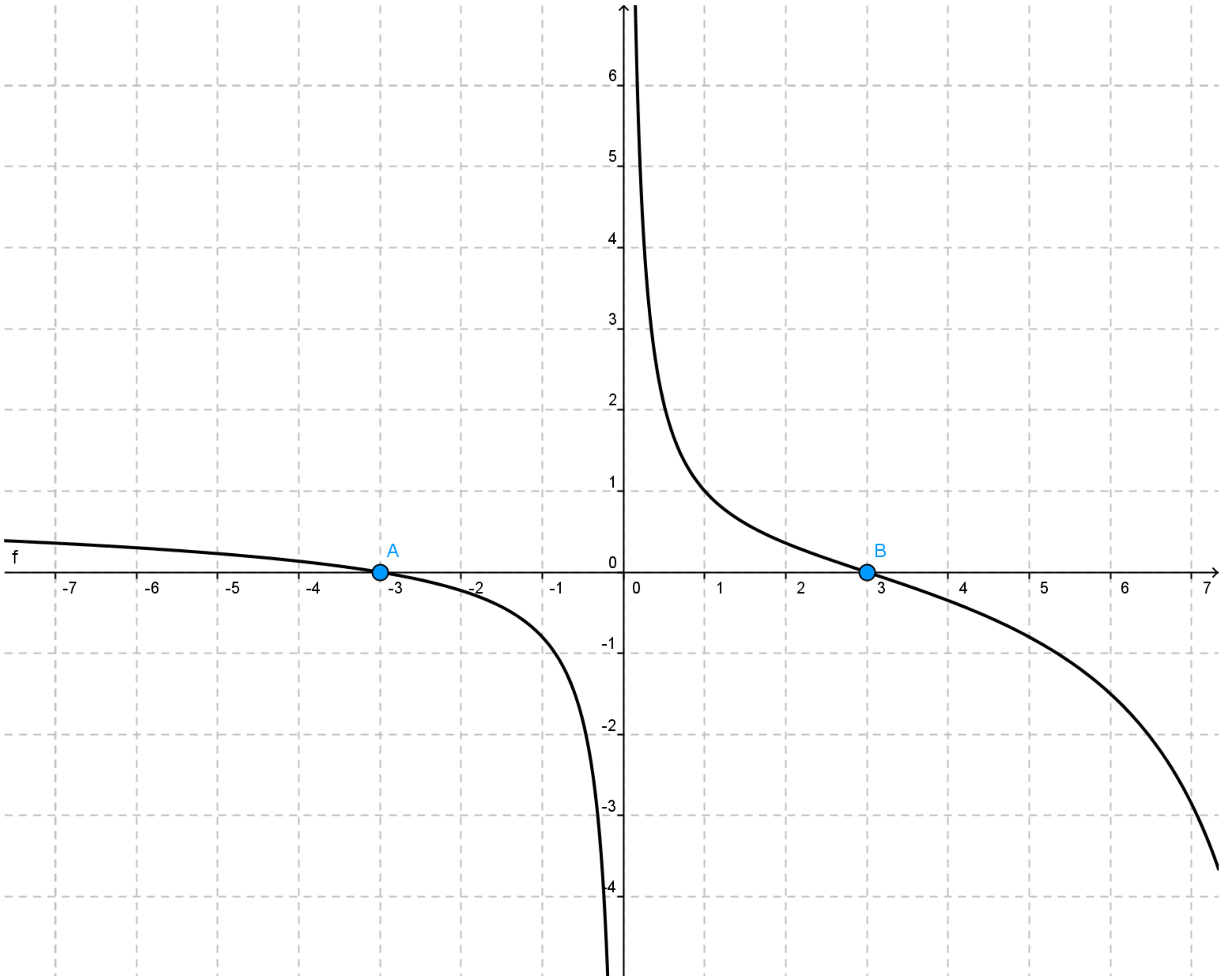
The zeros of this function are when $t = -3, 3$ $(\text{or } t = \pm 3)$. We can write our answer like this:

Zeros: $-3, 3$

On the next page, you will find a portion of the graph for $f(t) = \frac{t^2-9}{t^2-9t}$.

We discovered that the **domain** is $\boldsymbol{t \neq 0, 9}$. Do you see (at least for $t = 0$) why there is no solution possible (and that's why those values can't be included in the domain)?

We discovered that the **zeros** are $\mathbf{-3, 3}$. Do you see how the graph crosses the horizontal axis when $t = -3, 3$?


f
A
B
-7
-6
-5
-4
-3
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-1
0
1
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3
2
1
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-1
-2
-3
-4