Function Graphs

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January 14, 2015

The graph of a function f is the graph of the equation $y = f(x)$. A function is called **continuous** if its graph has no breaks or holes.

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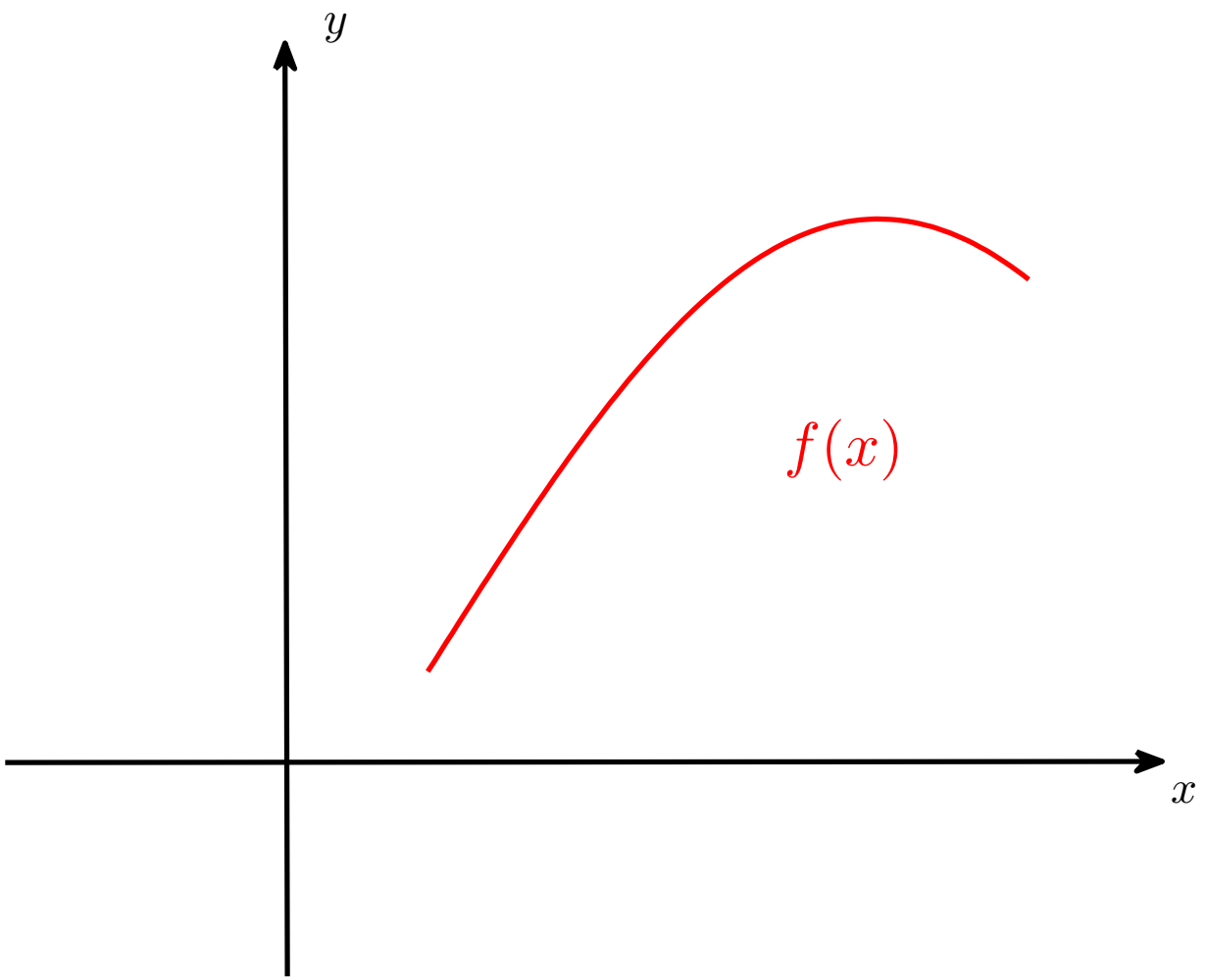

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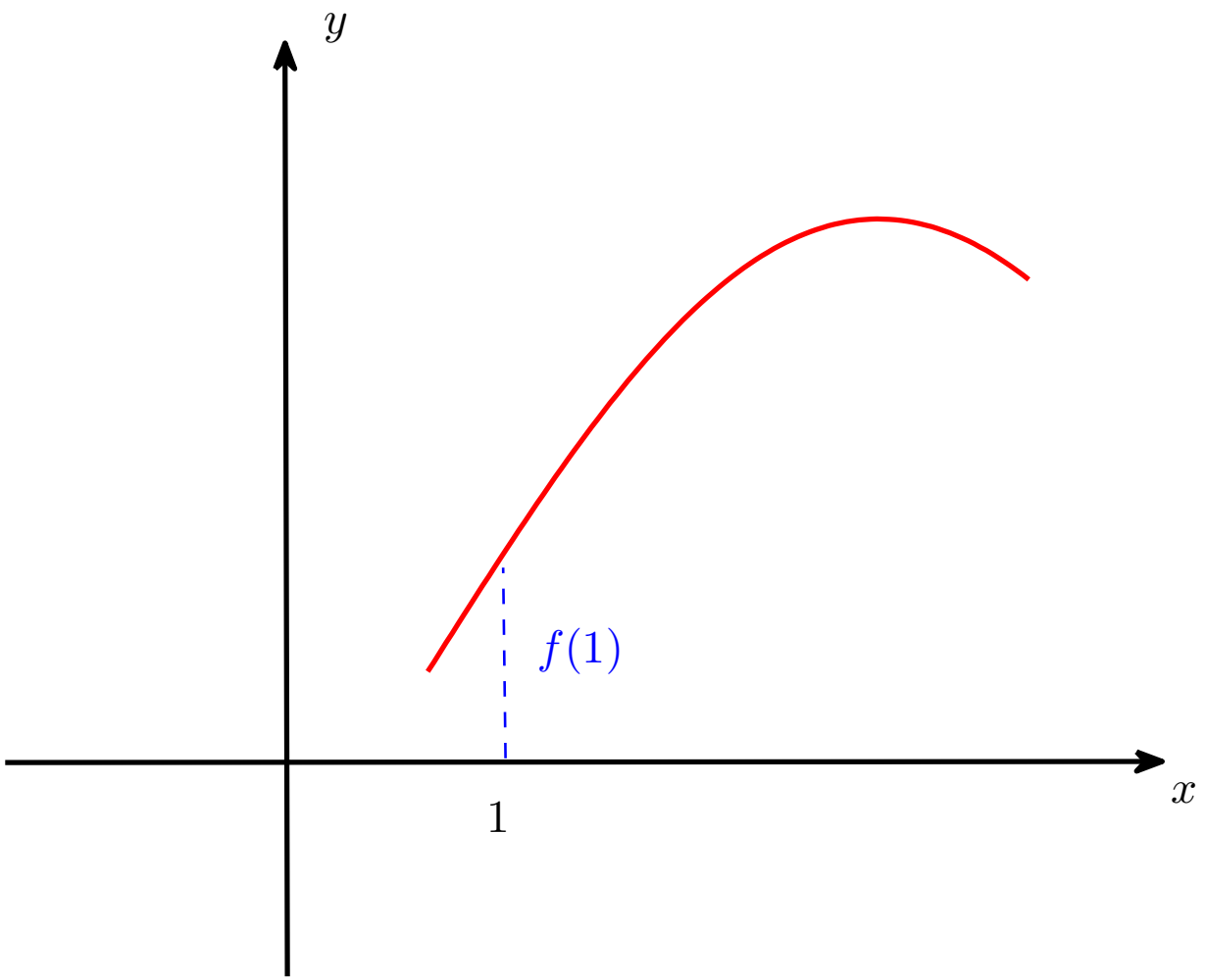

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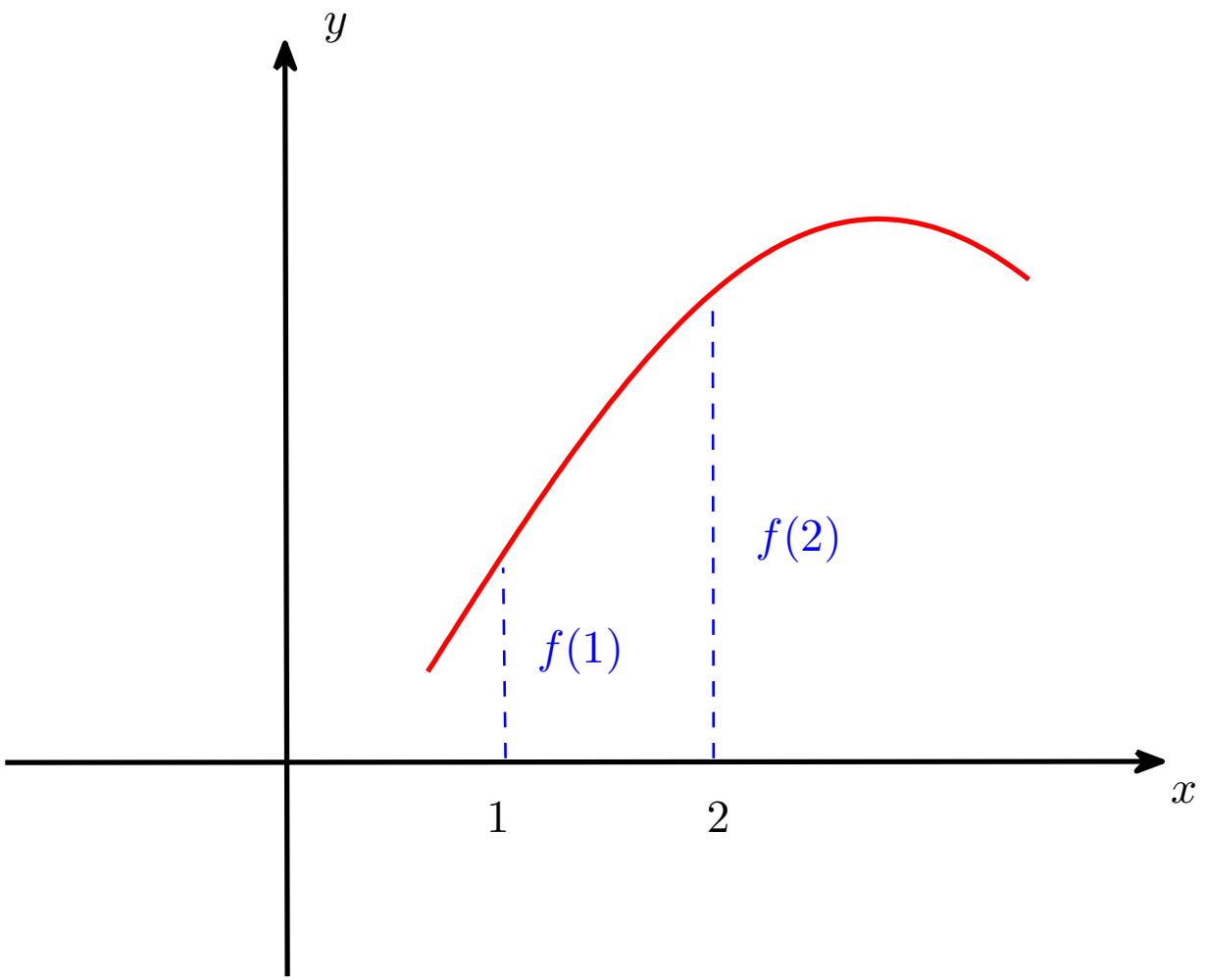

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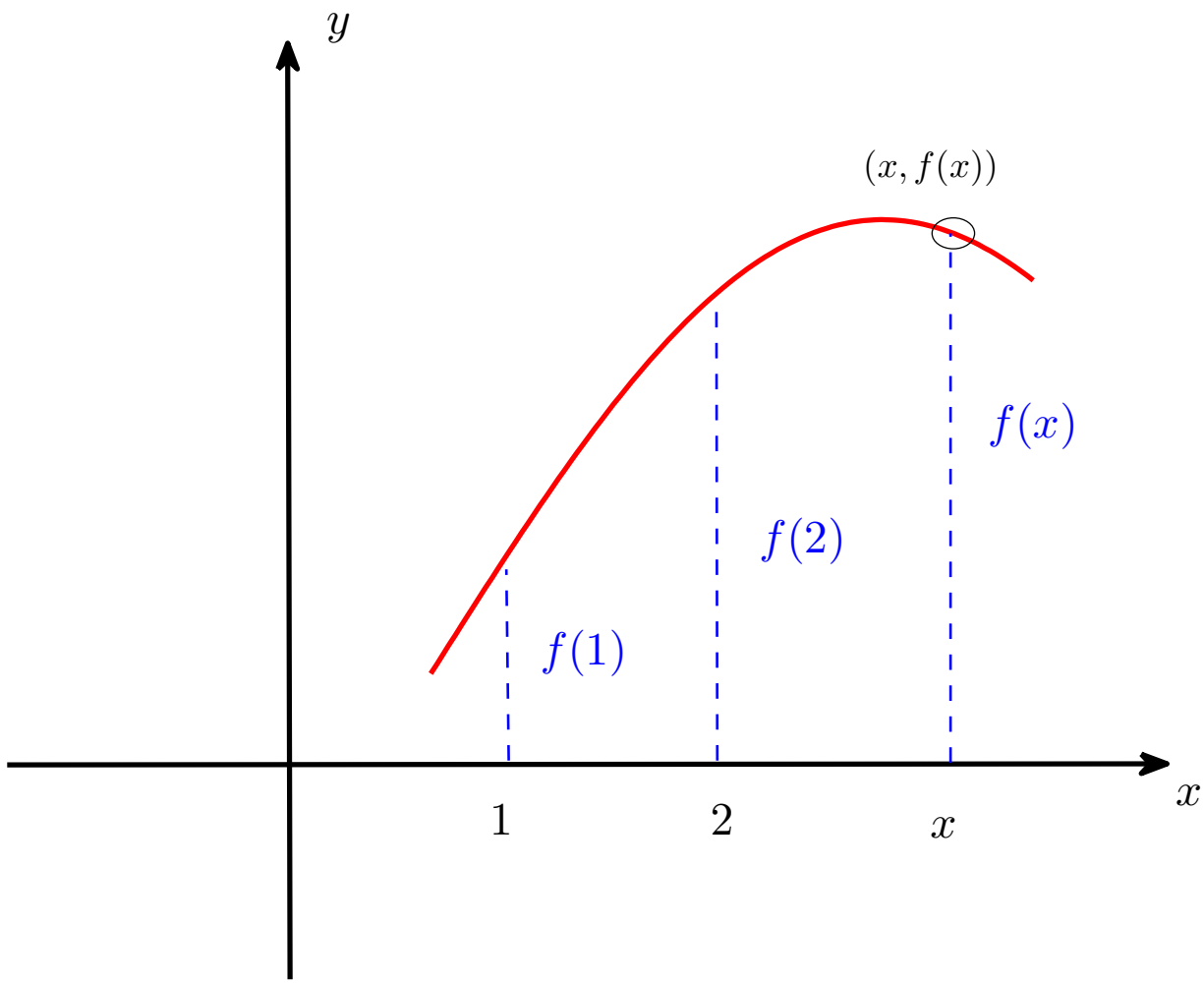

Definition

A function is a special type of relation. A FUNCTION is a correspondence between a first set, called the *domain*, and a second set, called the *range*, such that each member of the domain corresponds to *exactly one* member of the range.

However, different elements of the domain are allowed to have a correspondence with the same value in the range.

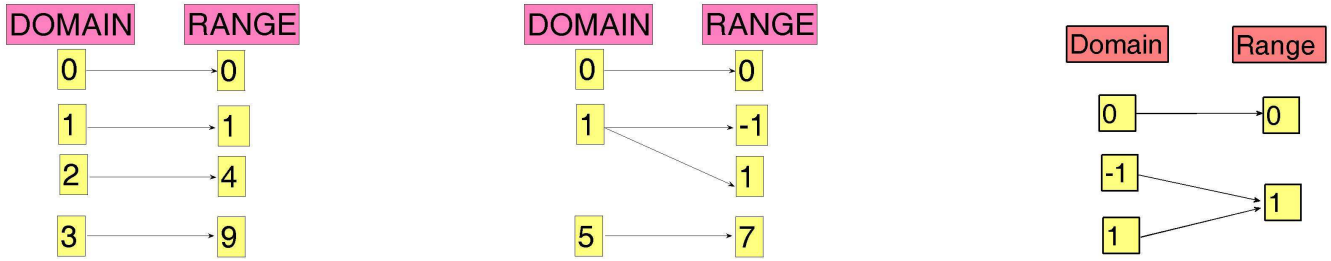

Figure : F is a FUNCTION (left), R is a relation but NOT A FUNCTION (center) & an example of a function (right) whose two different domain elements are associated with the same range element.

Theorem (VERTICAL LINE TEST (VLT))

A curve in the coordinate plane is the graph of a function if and only if there is no vertical line that crosses the graph more than once.

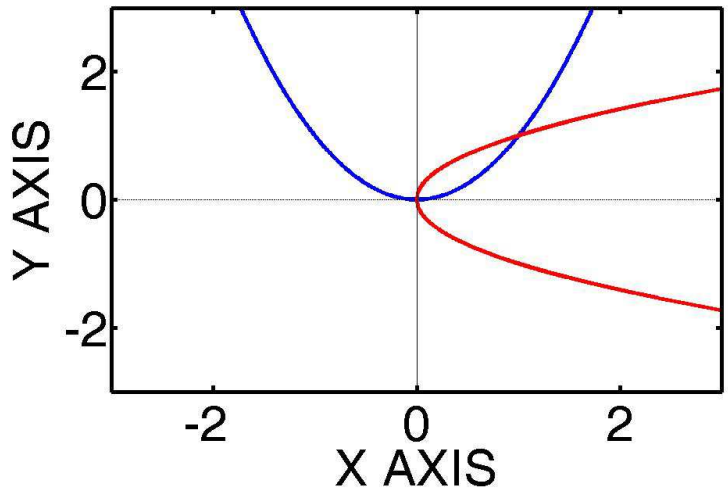

Figure : GRAPHS OF $y = x^2$ and $x = y^2$

Does the equation $x^2 + y^2 = 16$ define y as a function of x?

$p(x) = x^n$ is called a **power function**.

- If n is even, the graph of $f(x) = x^n$ is similar to the parabola $y = x^2$.
- If n is odd, the graph of $f(x) = x^n$ is similar to the cubic $y = x^3$.

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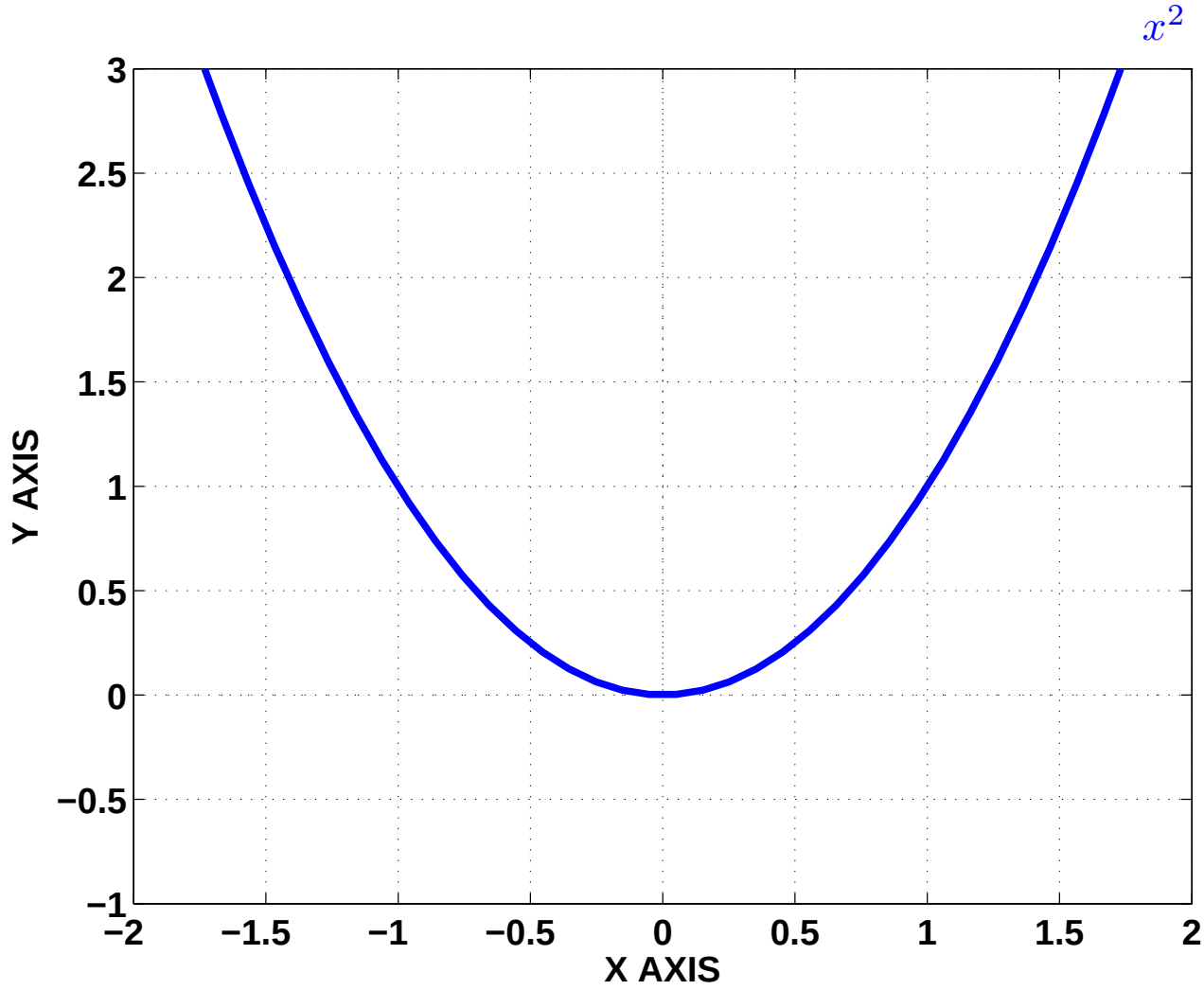

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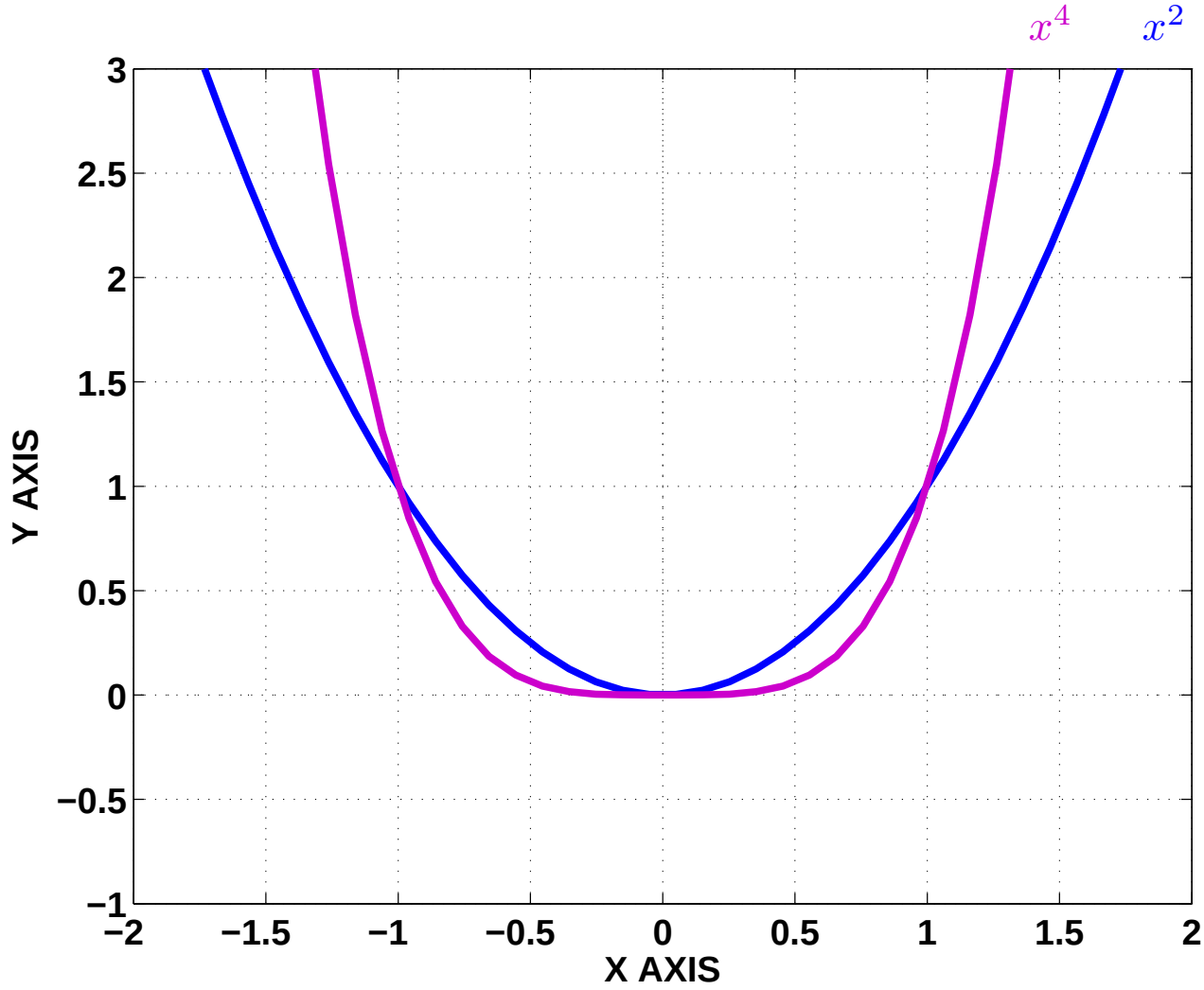

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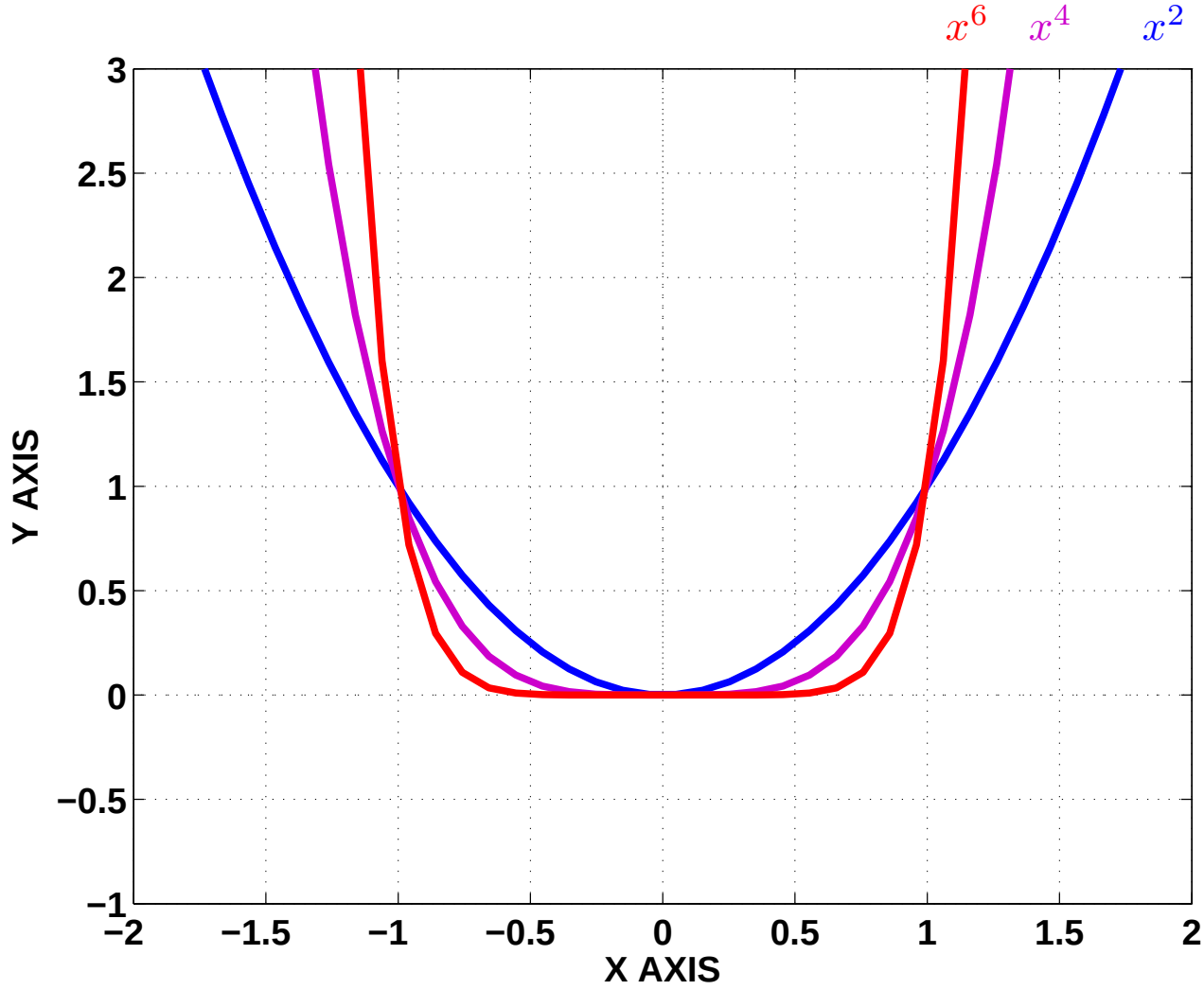

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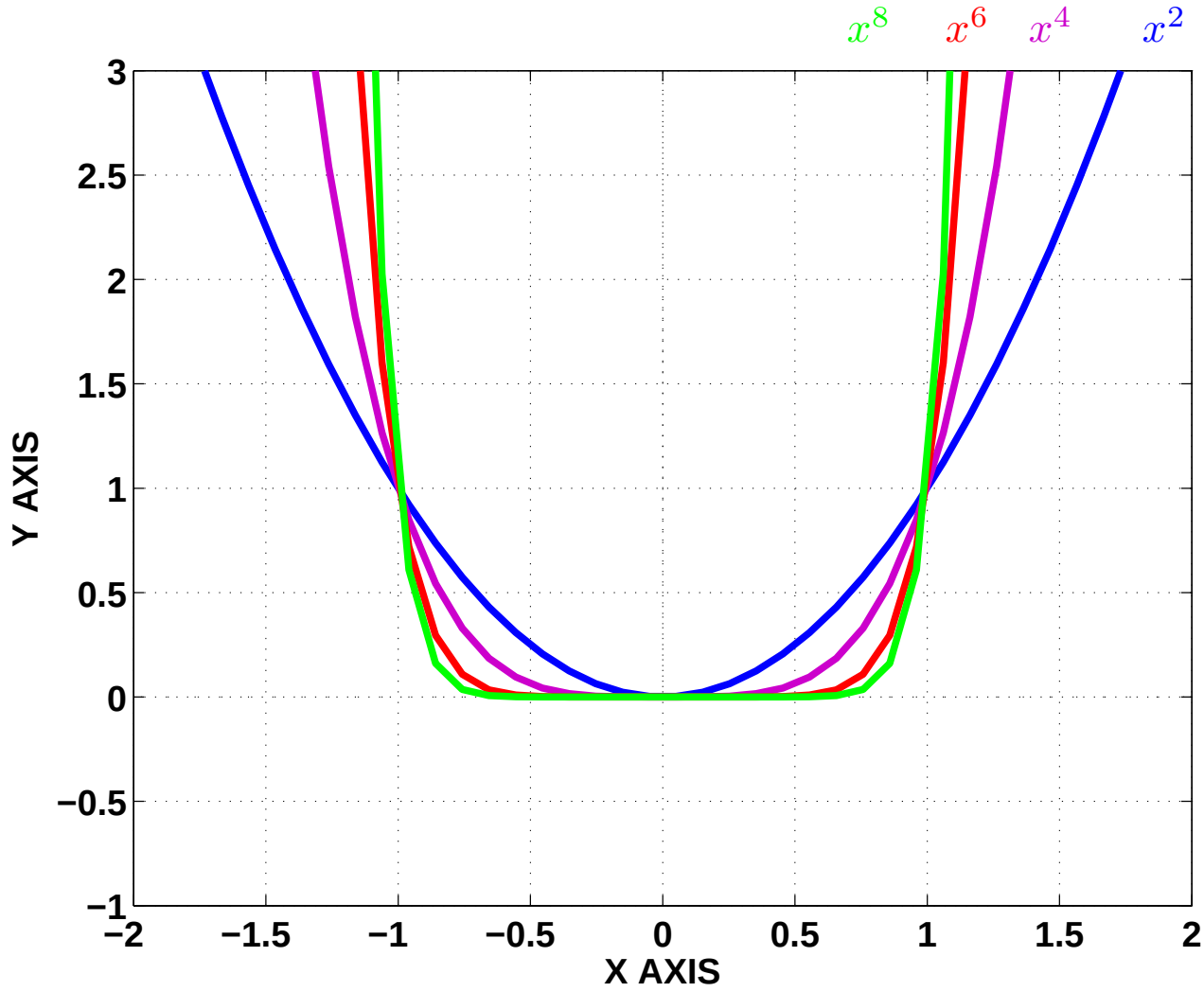

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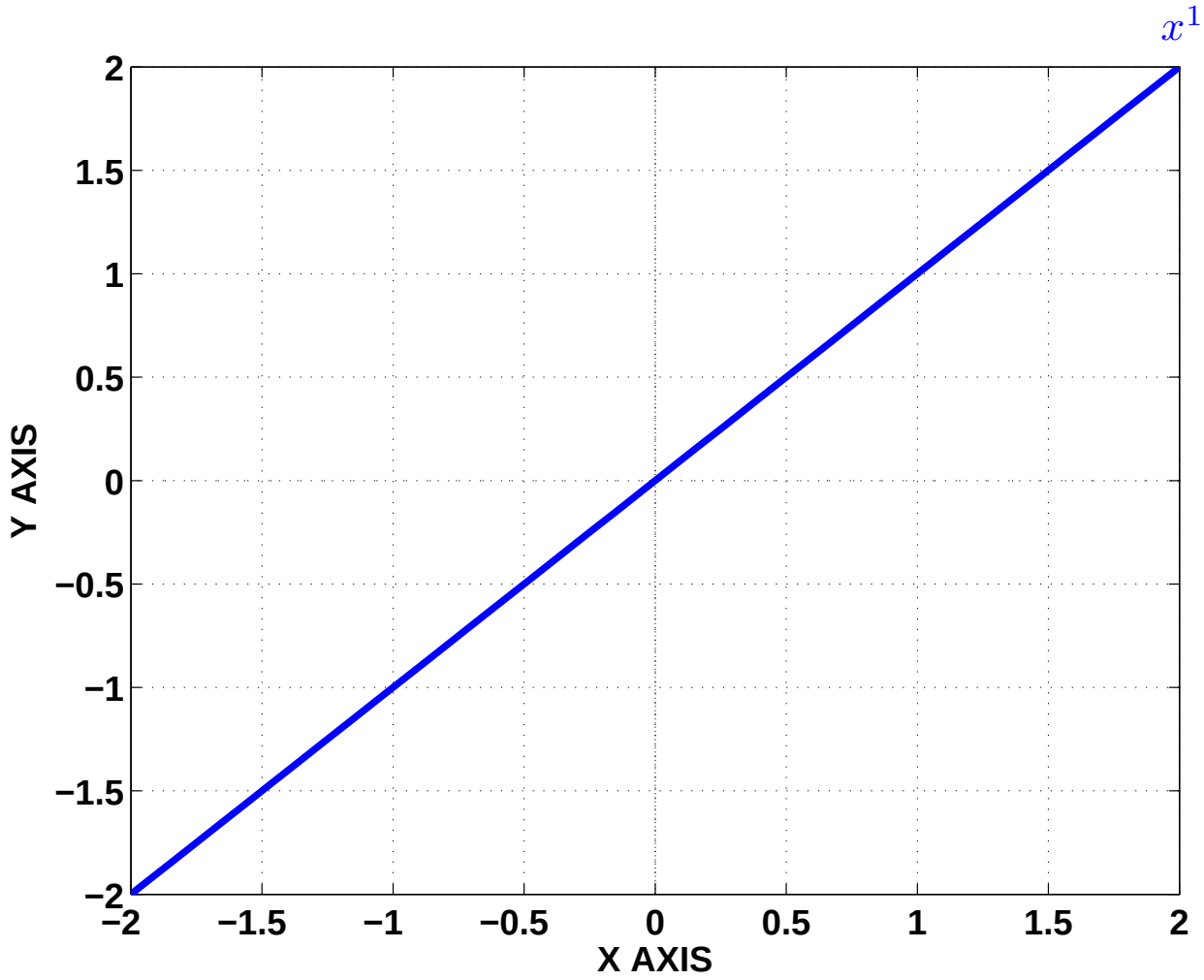

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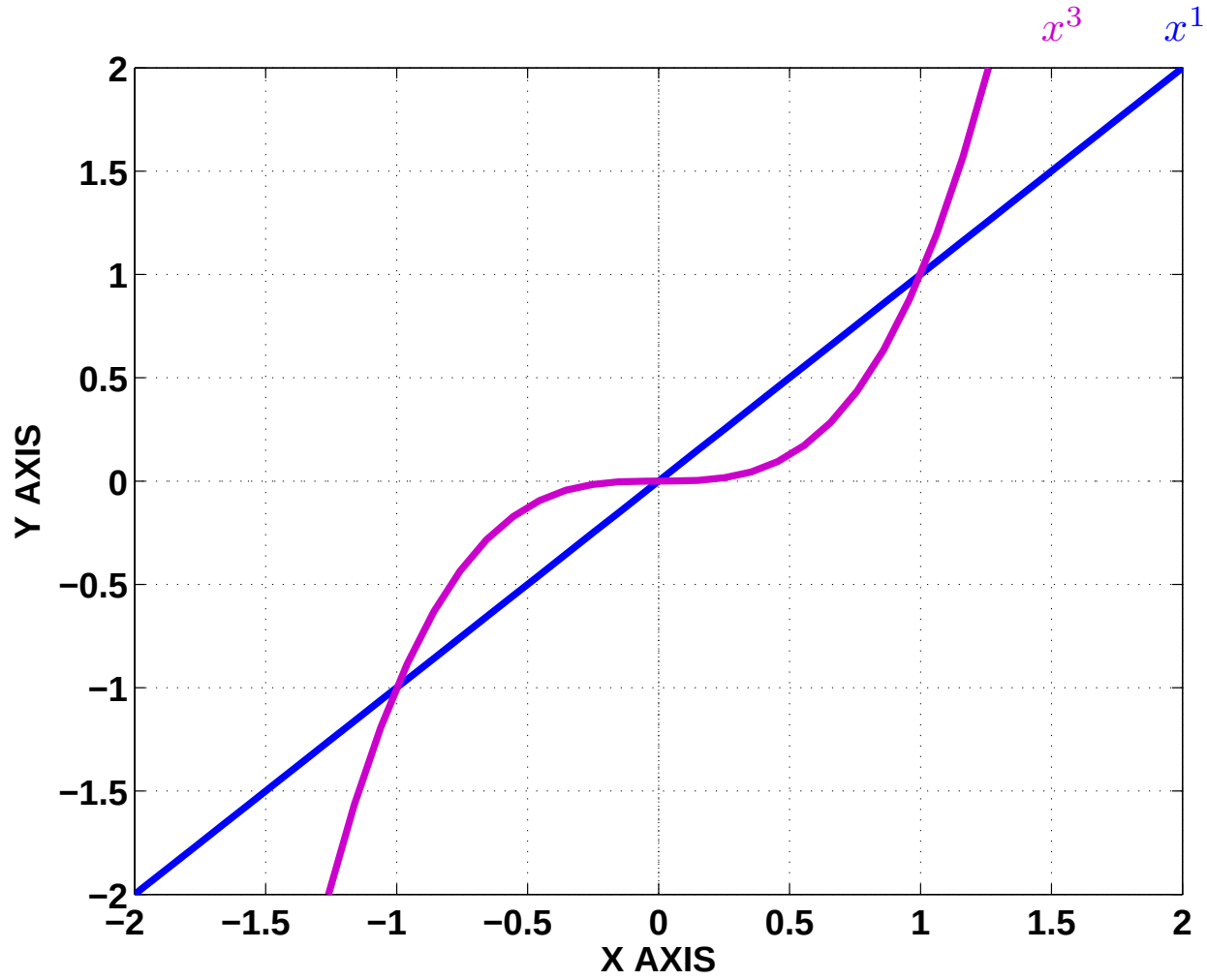

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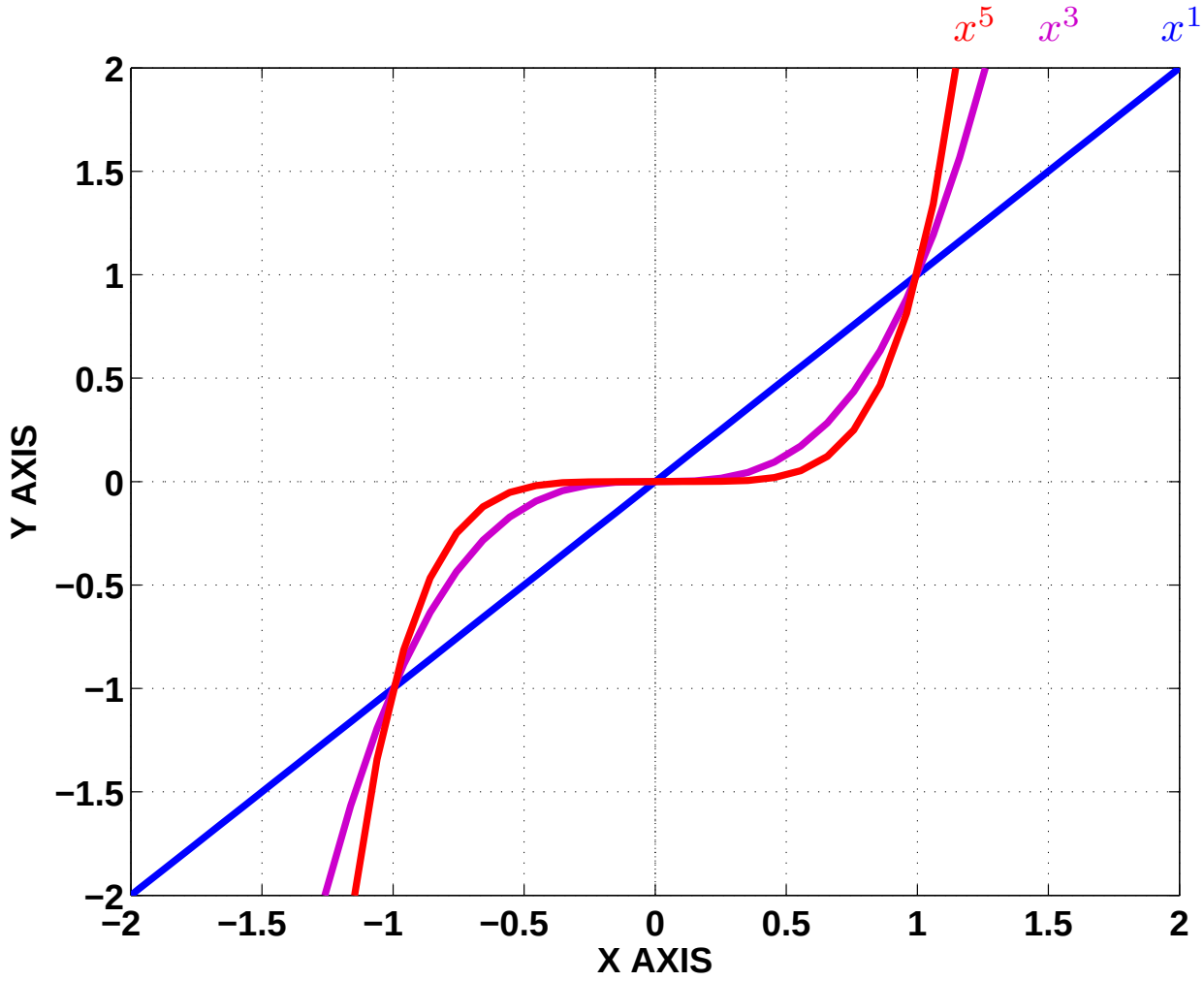

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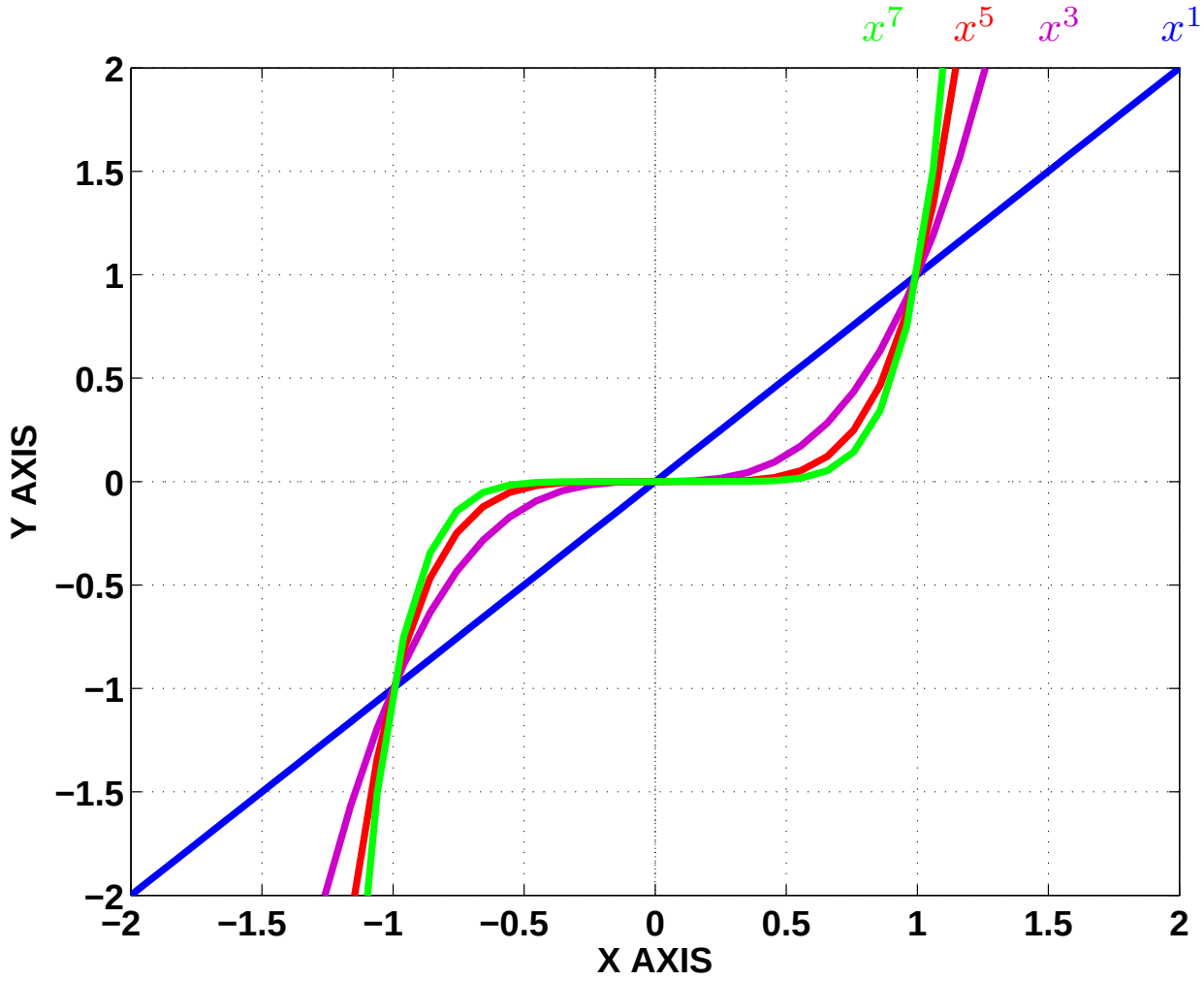

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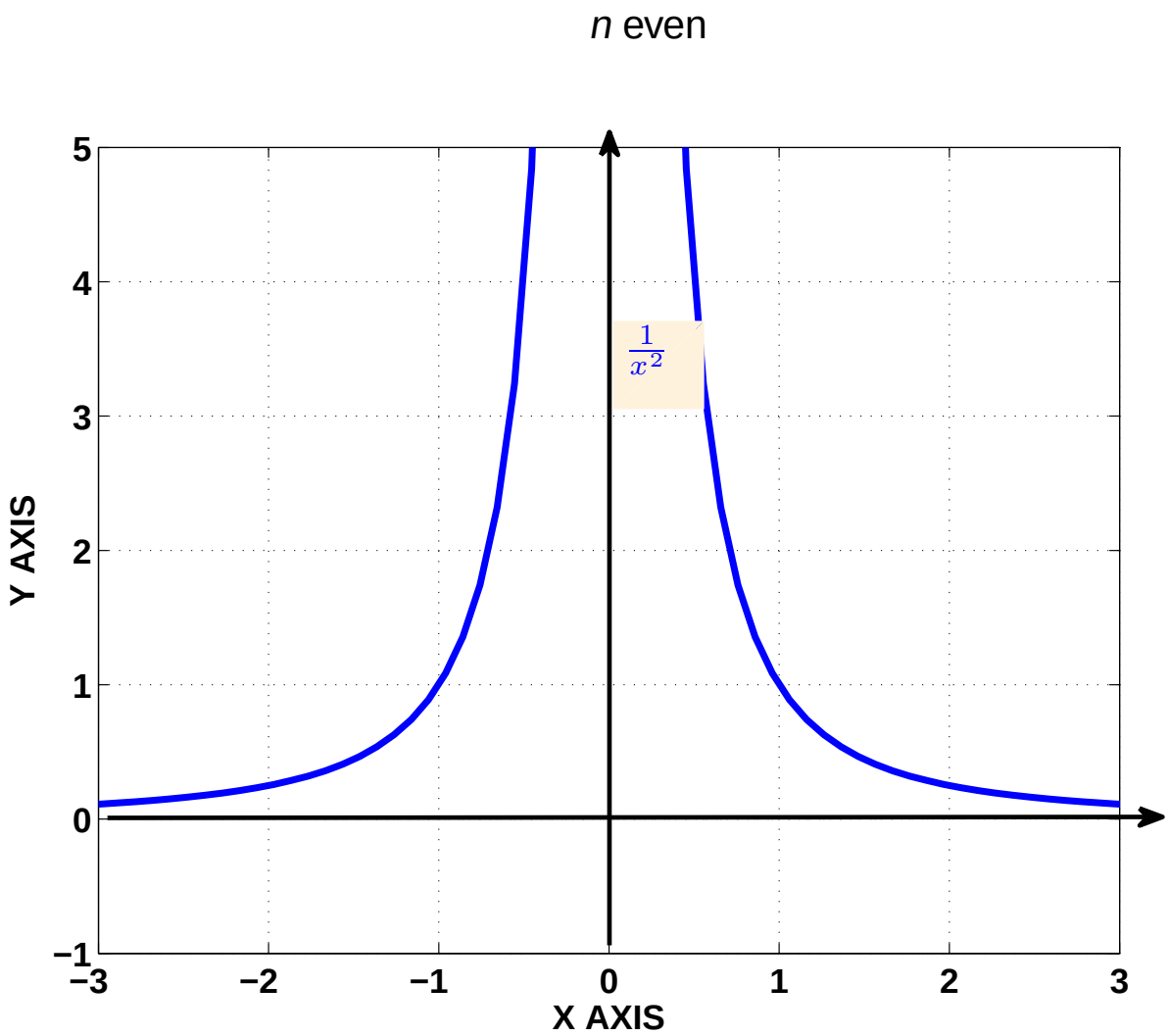

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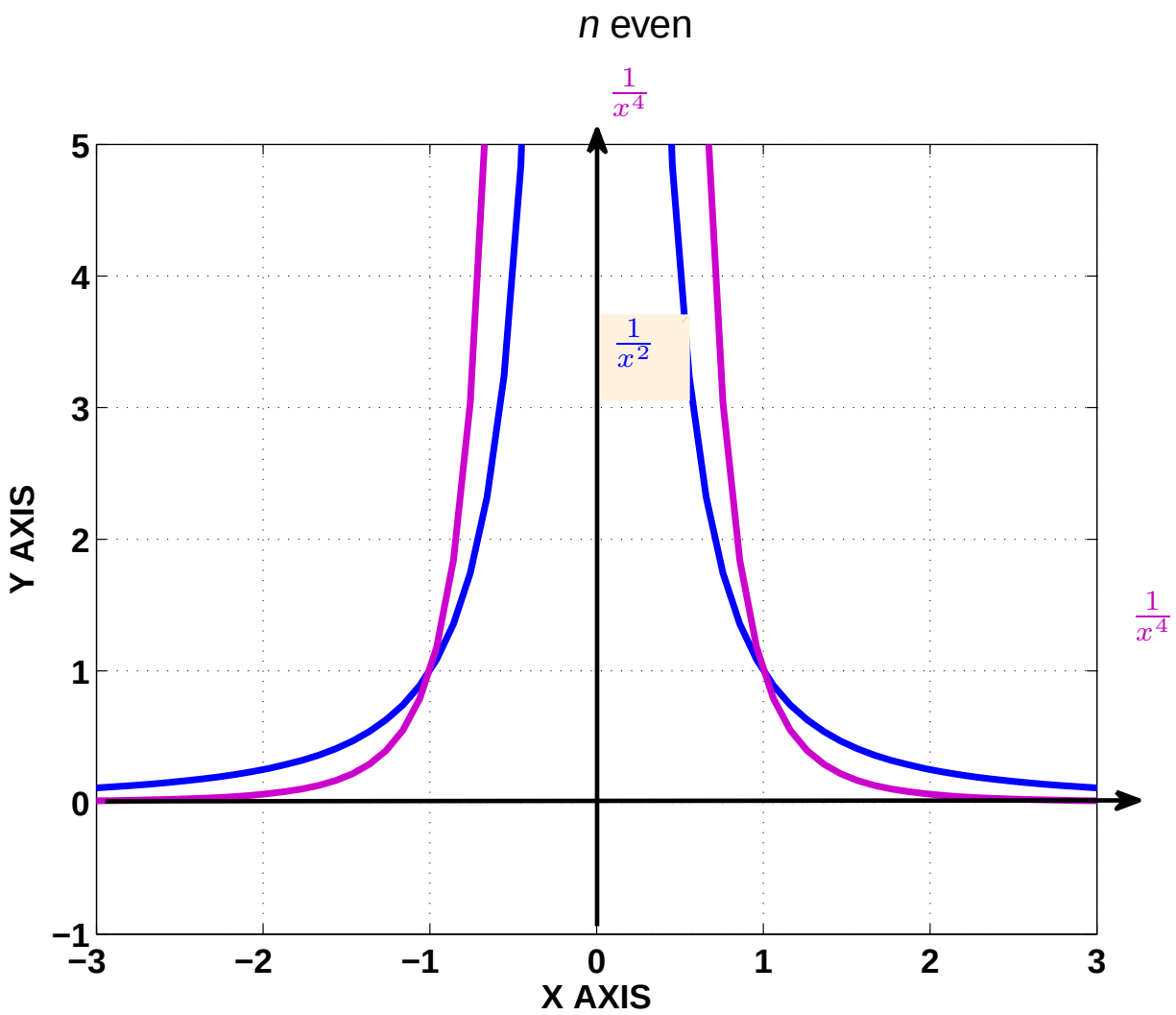

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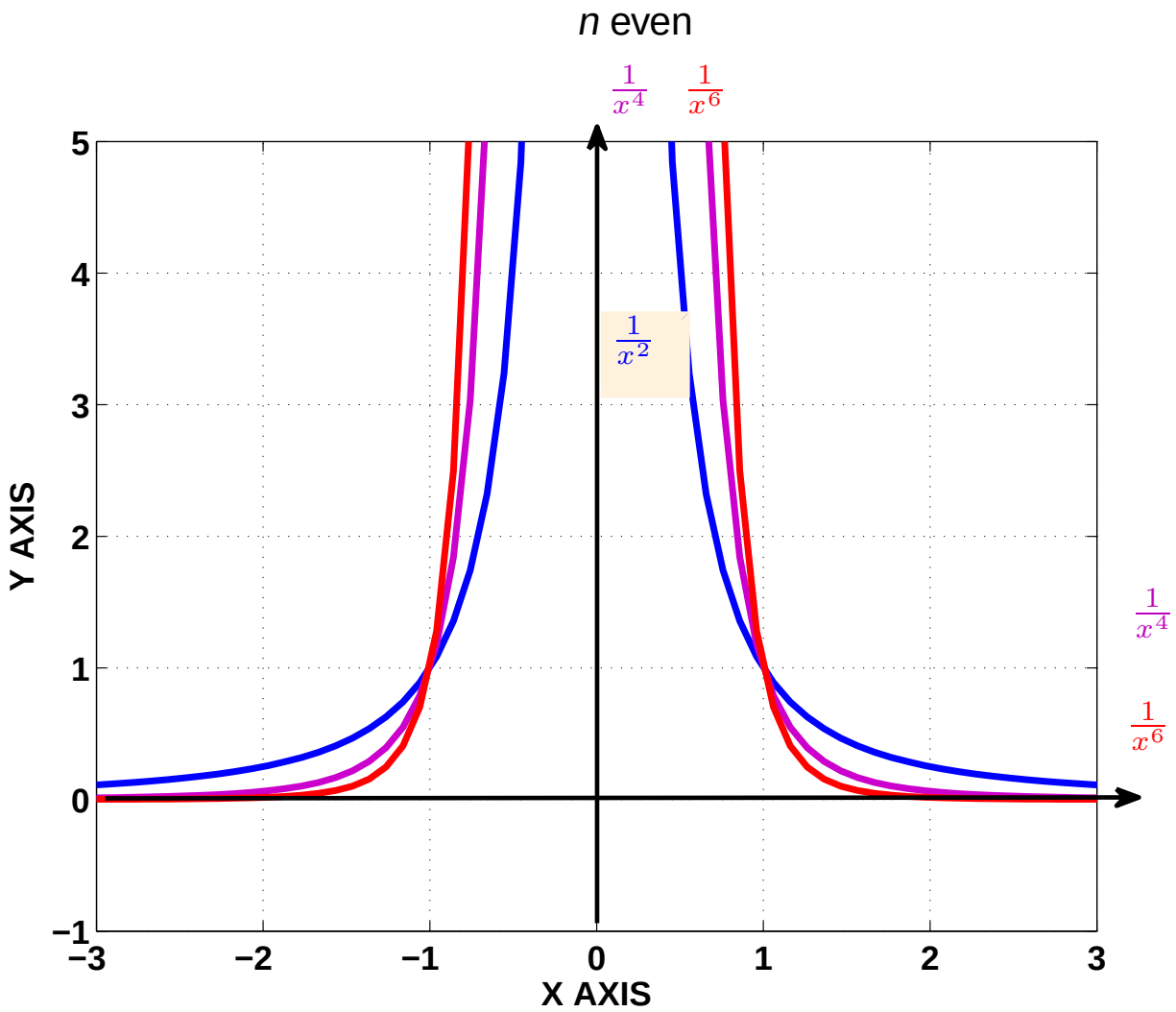

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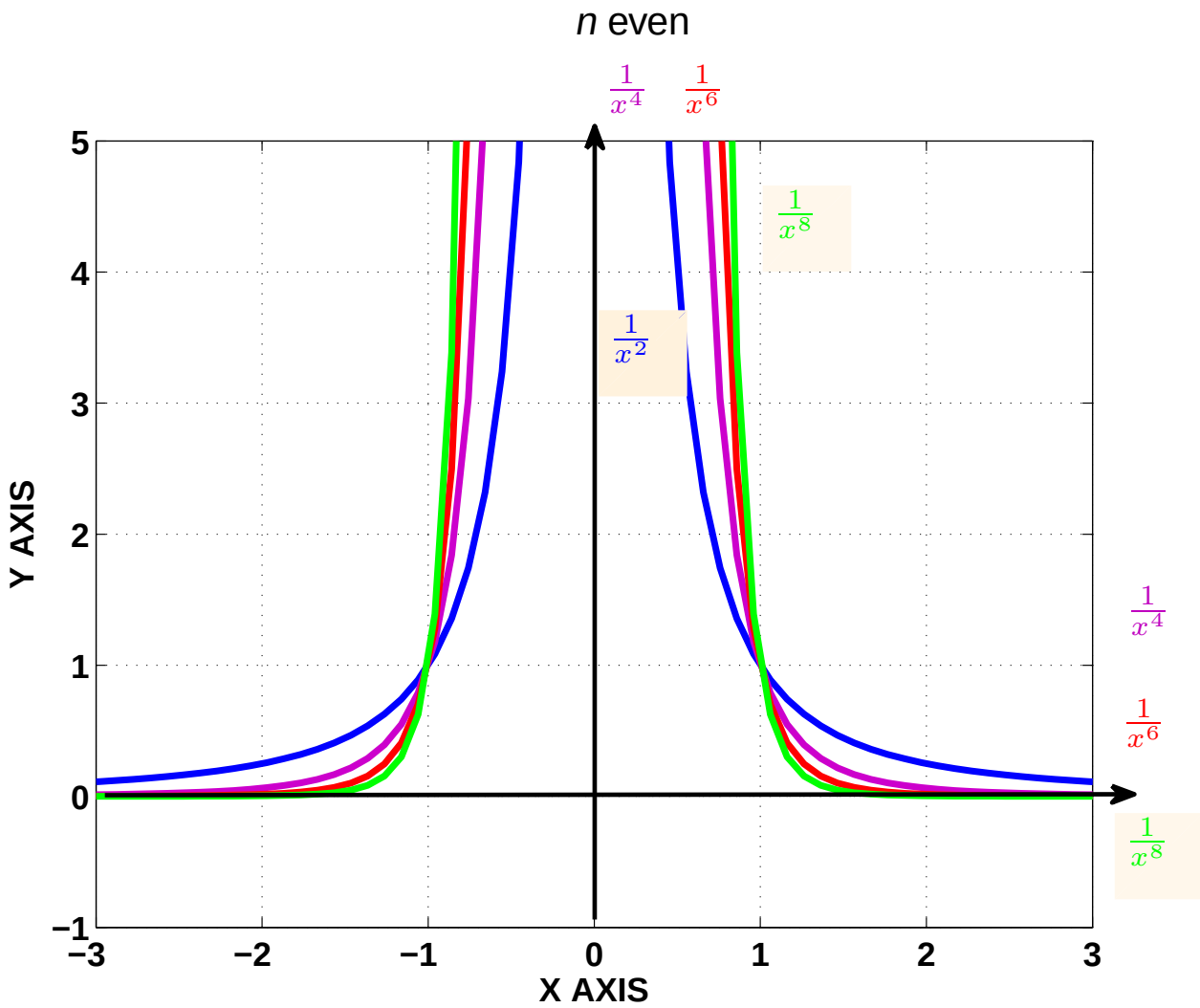

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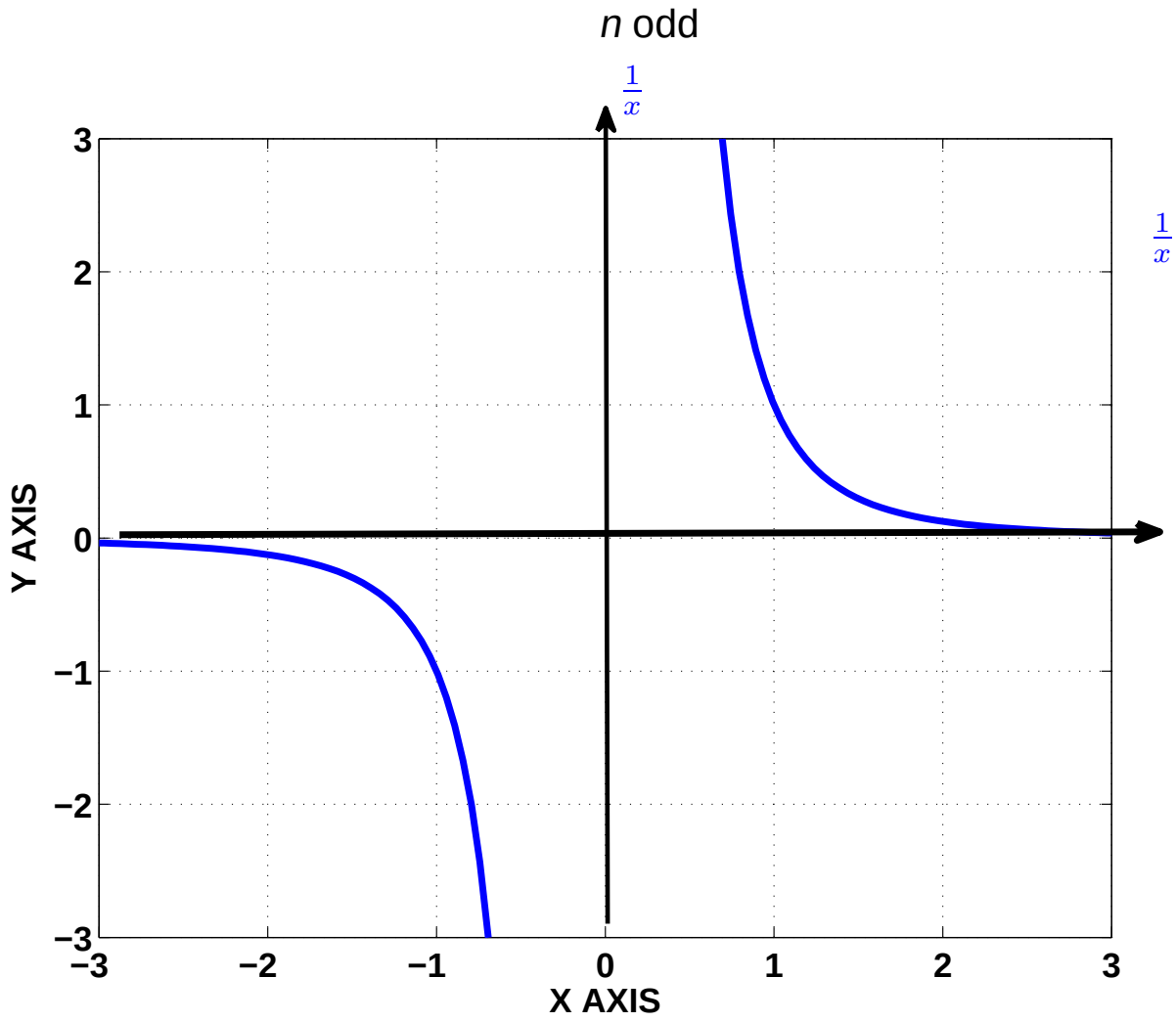

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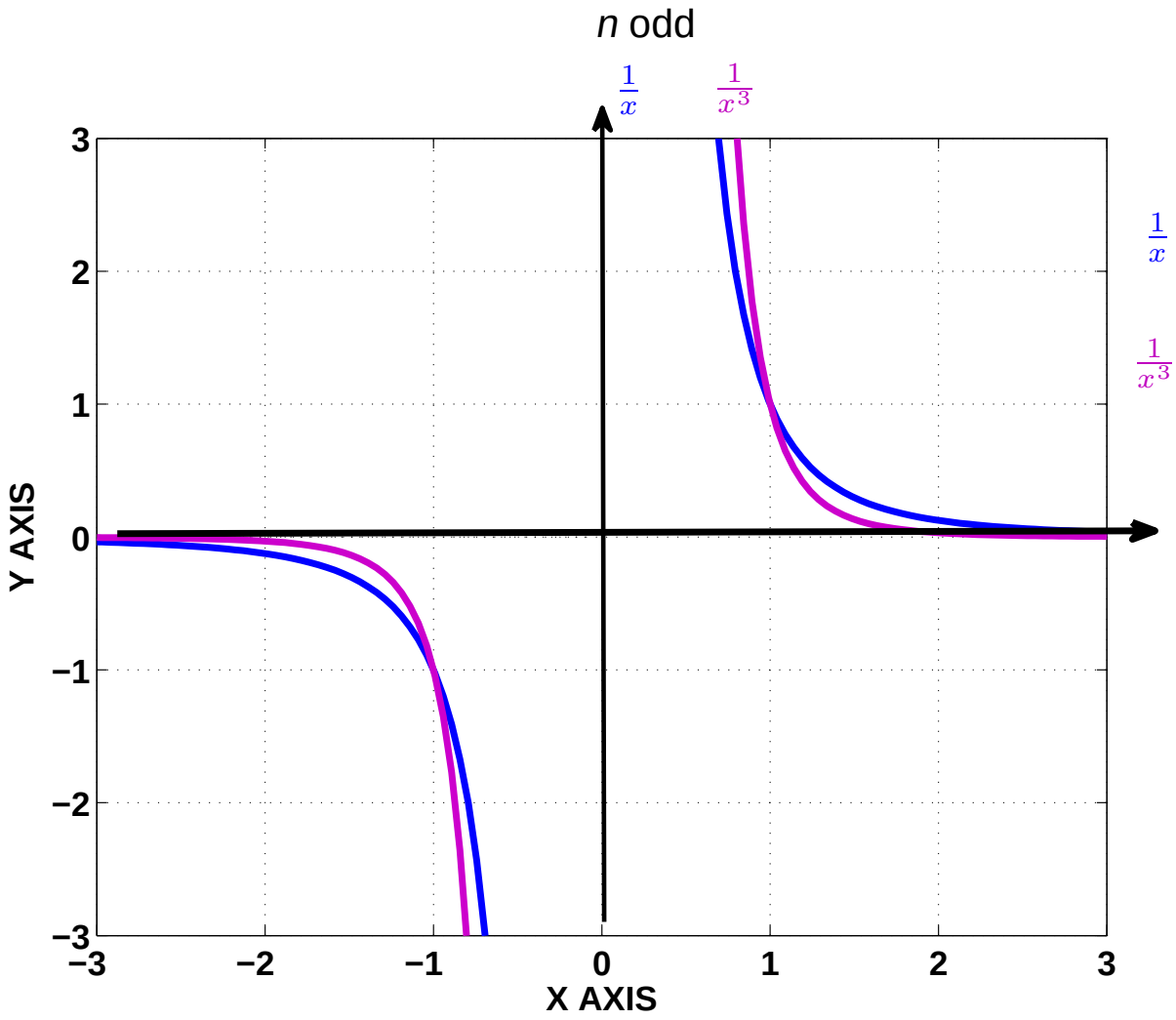

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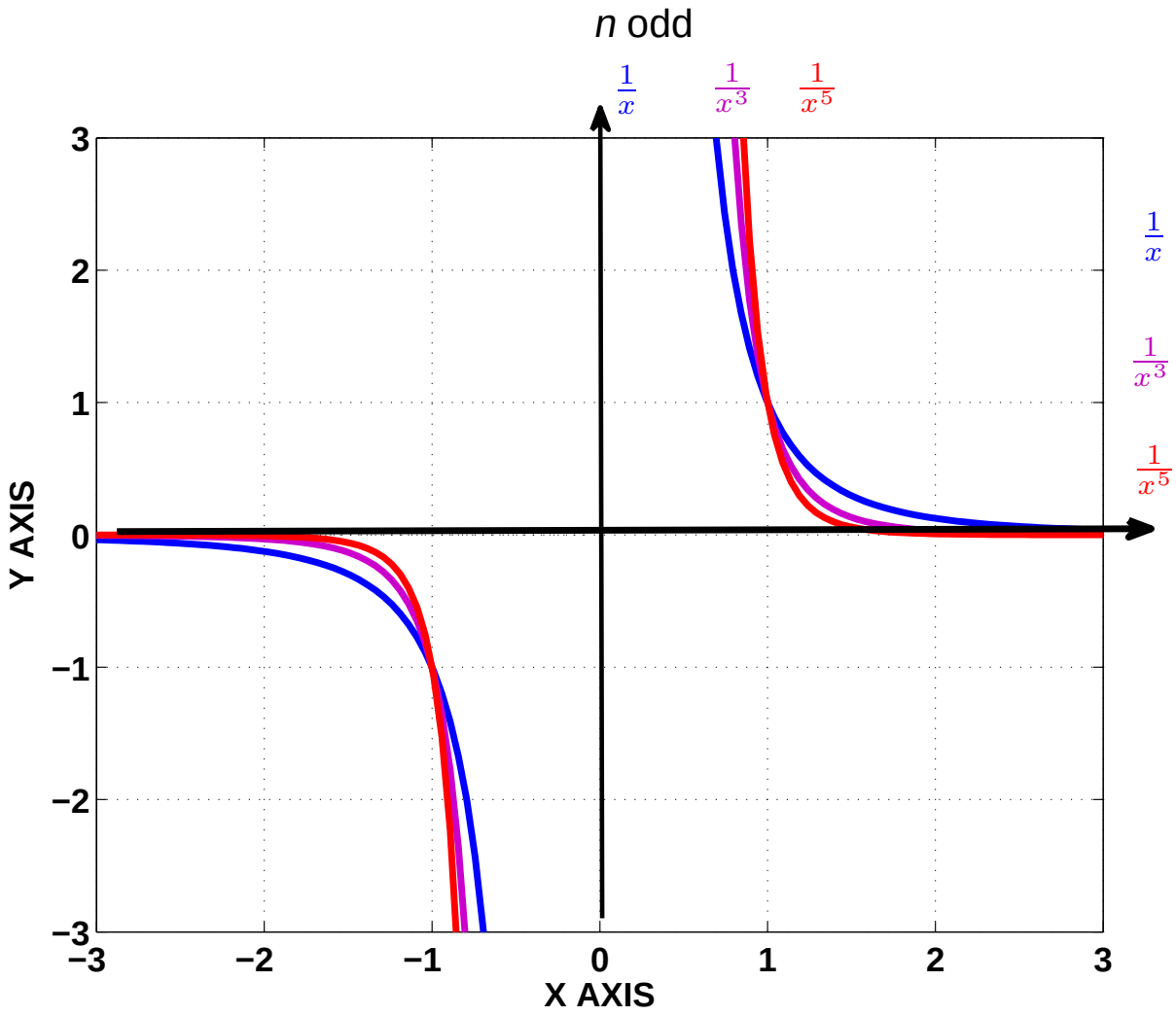

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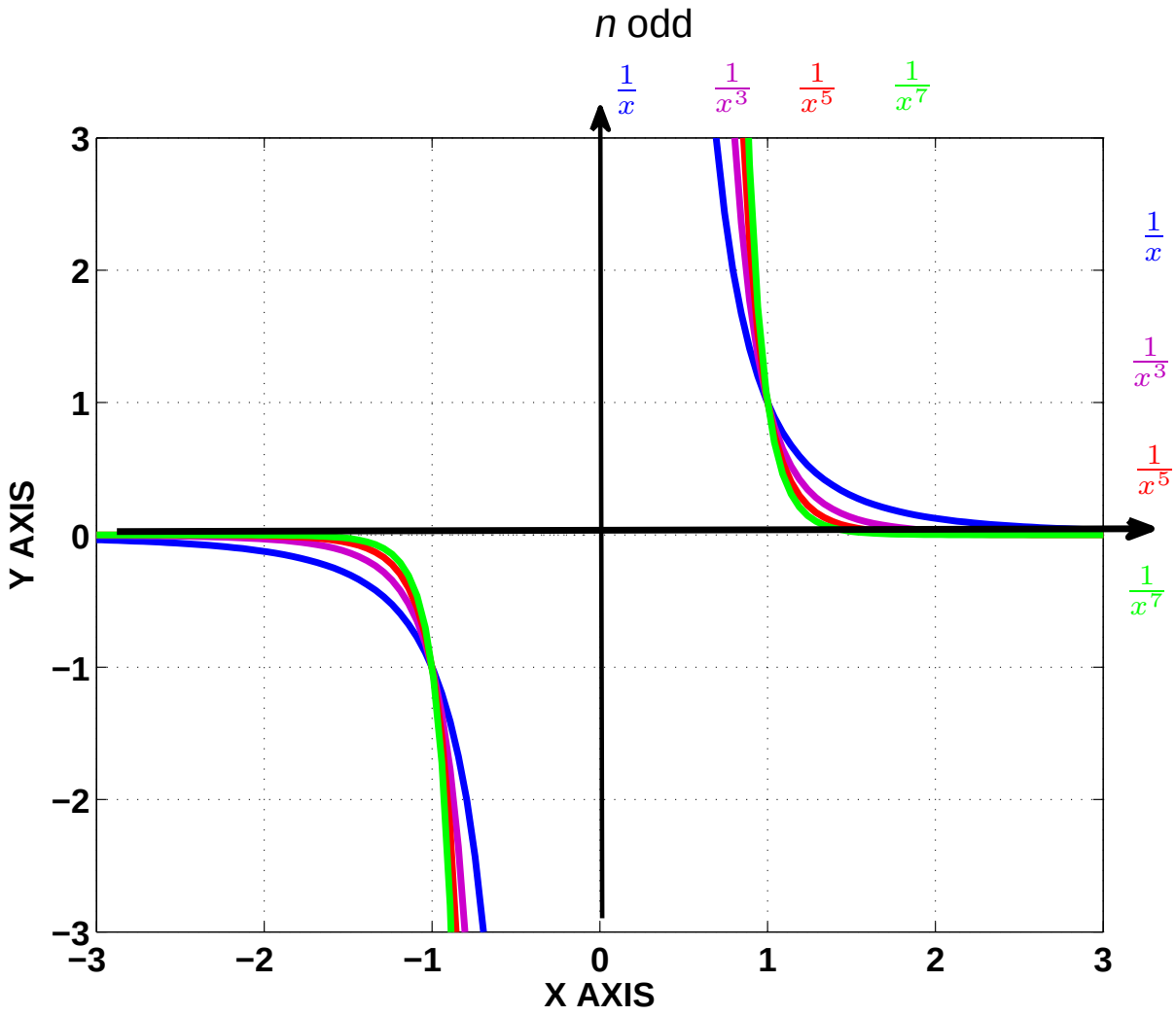

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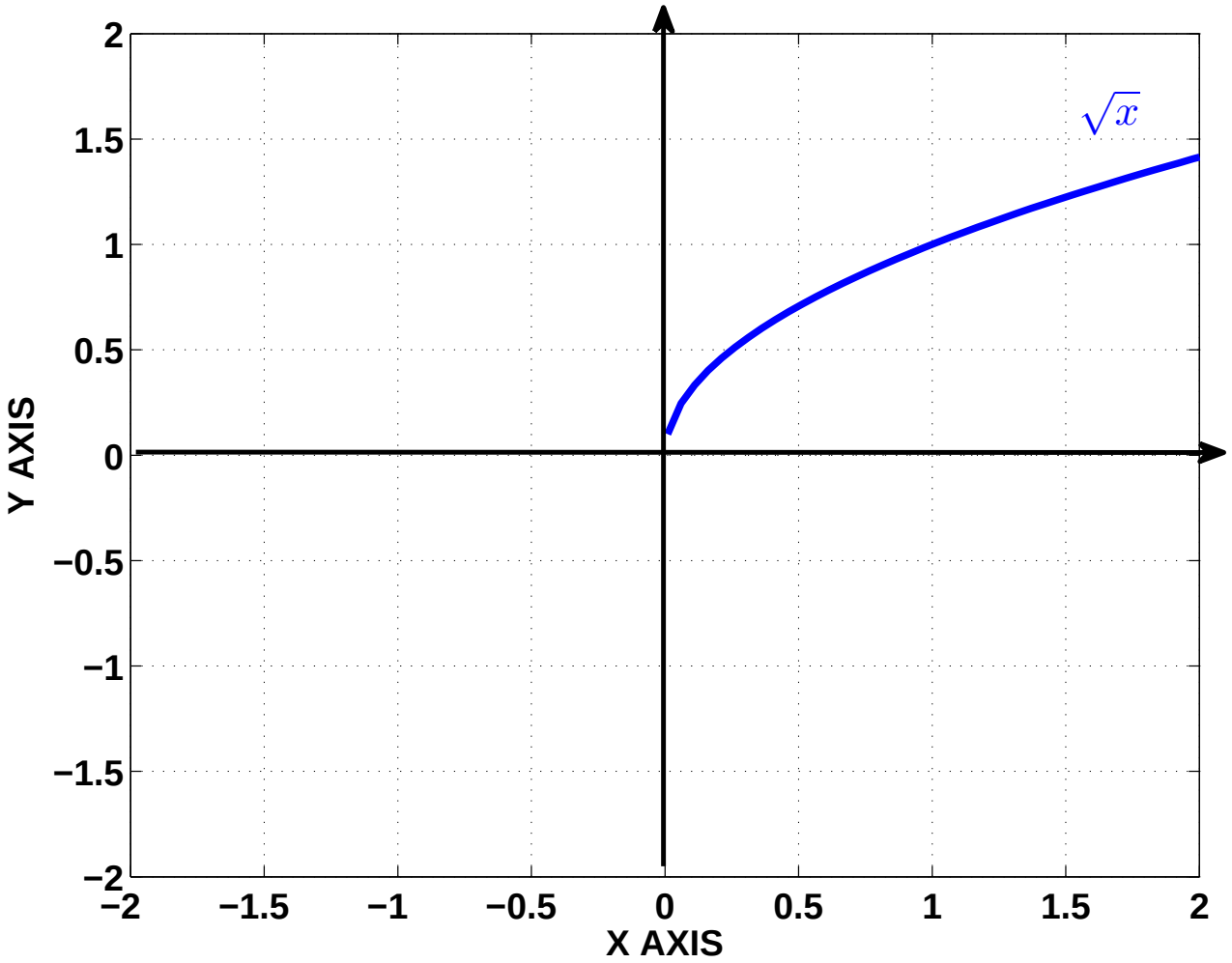

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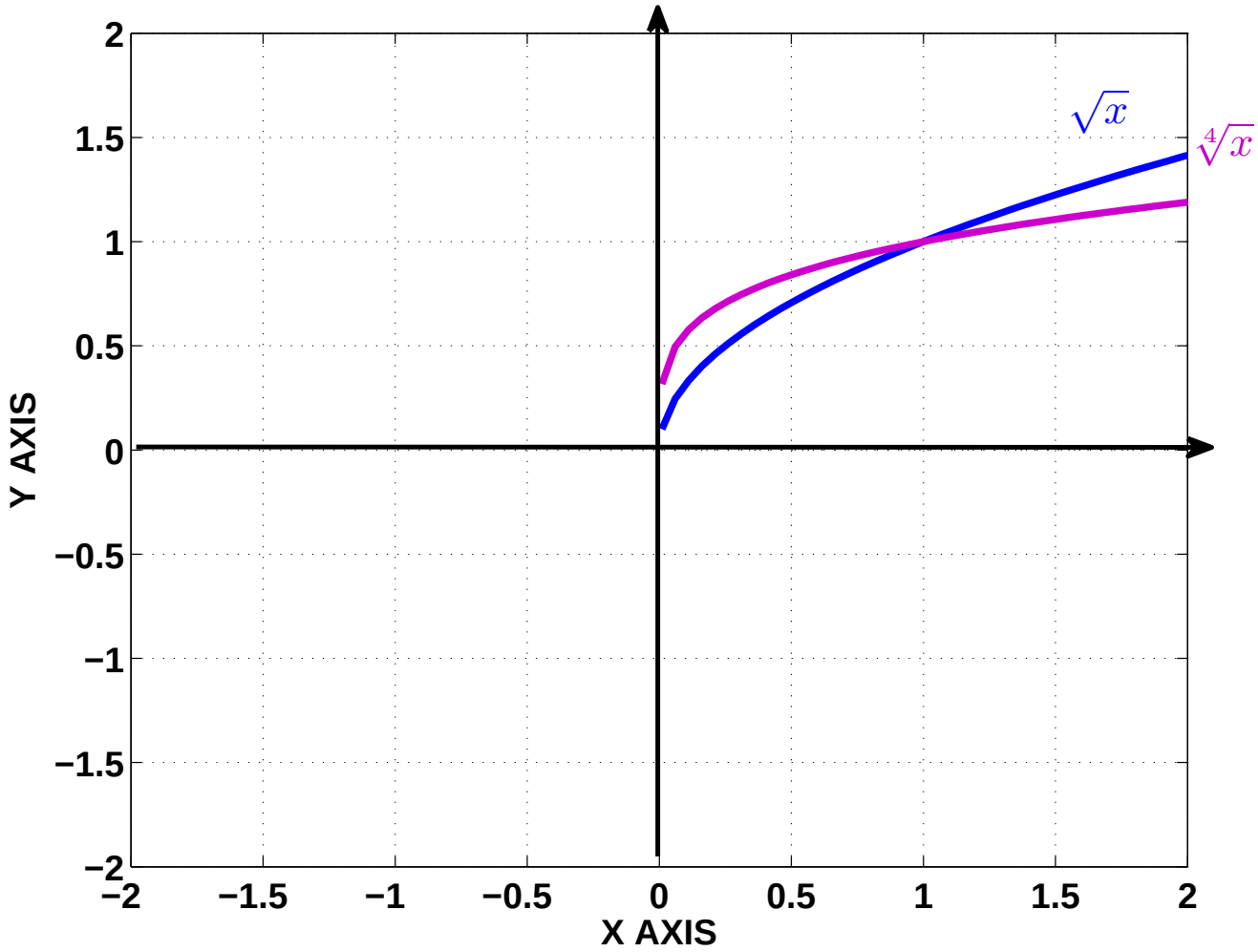

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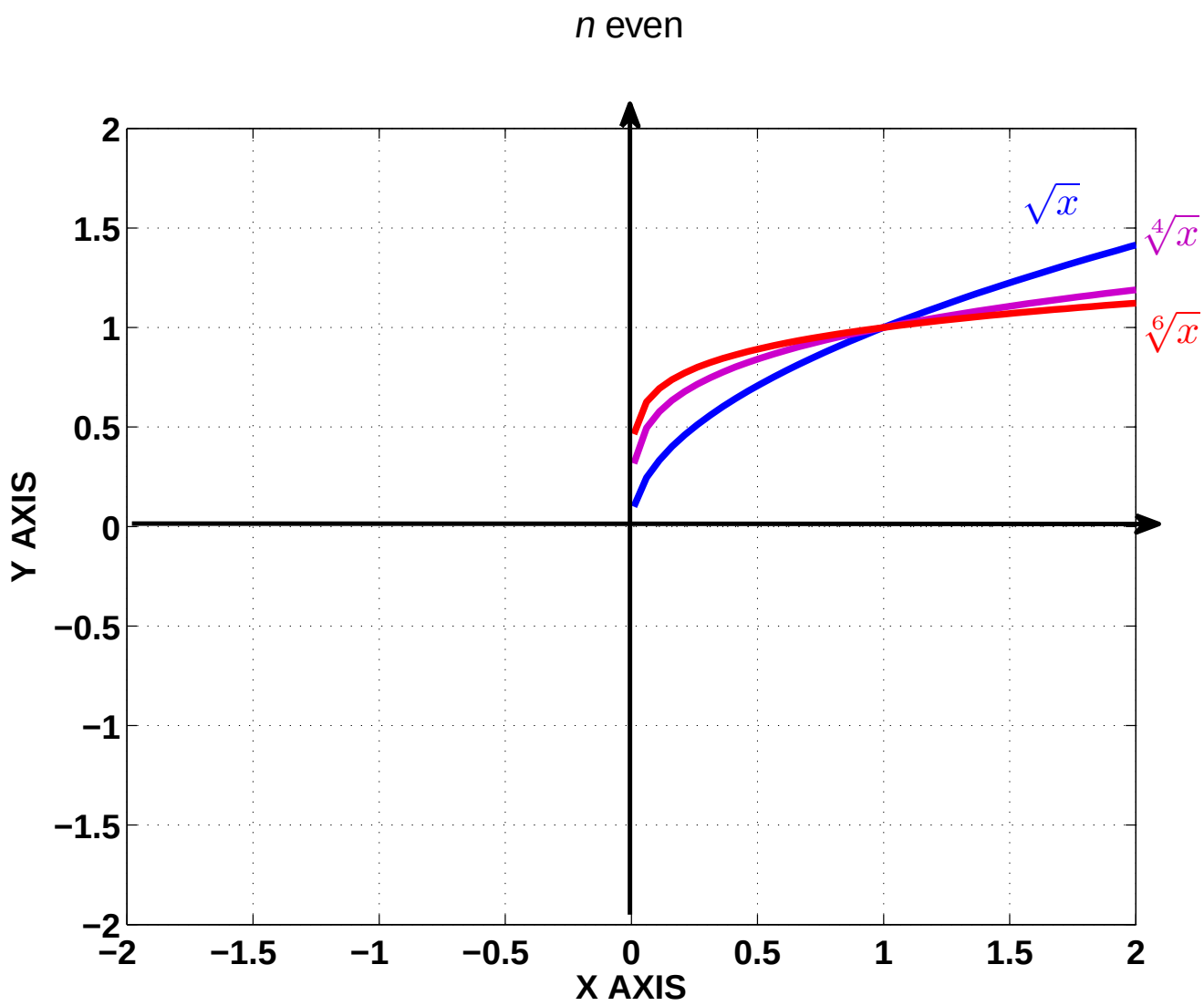

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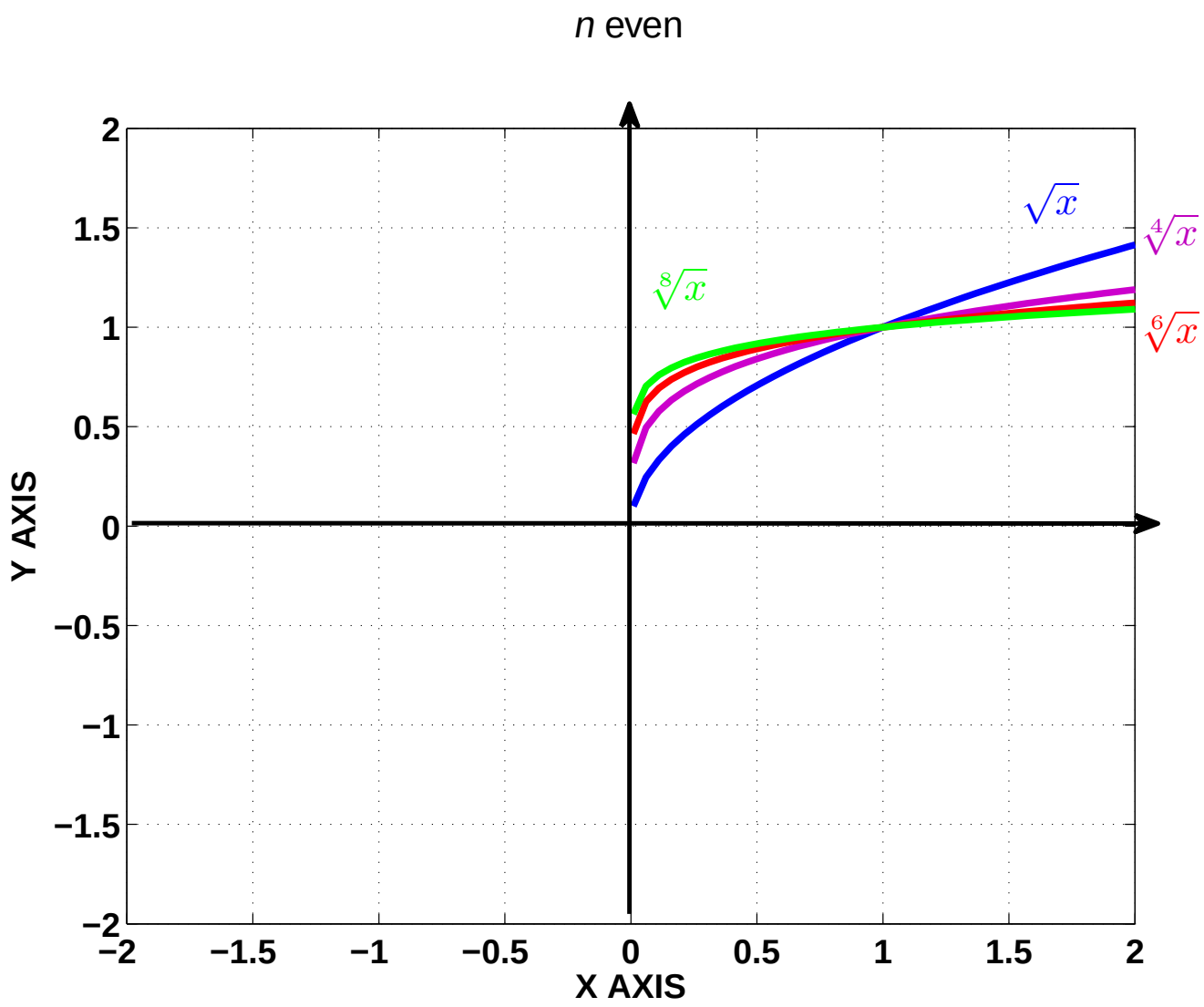

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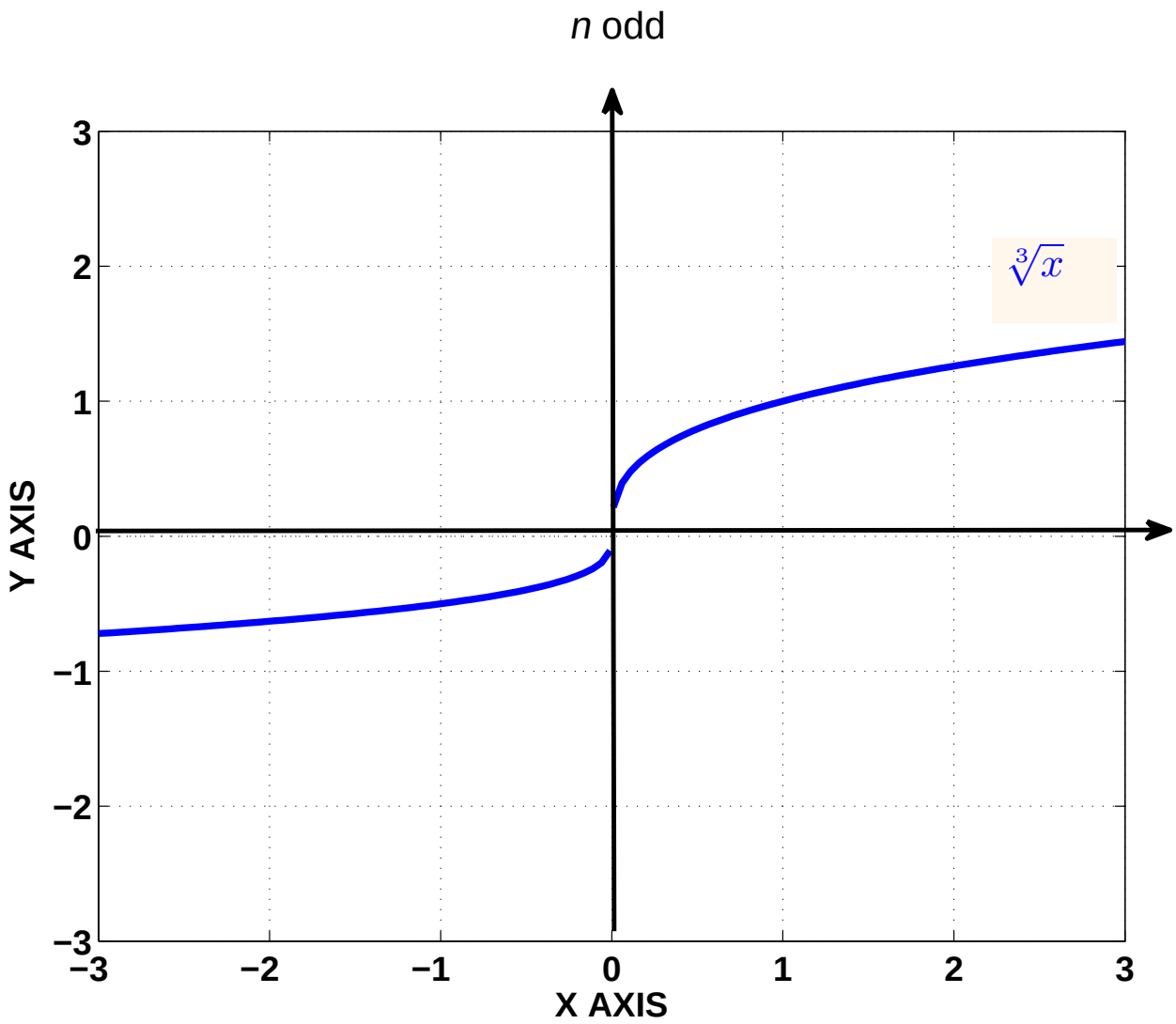

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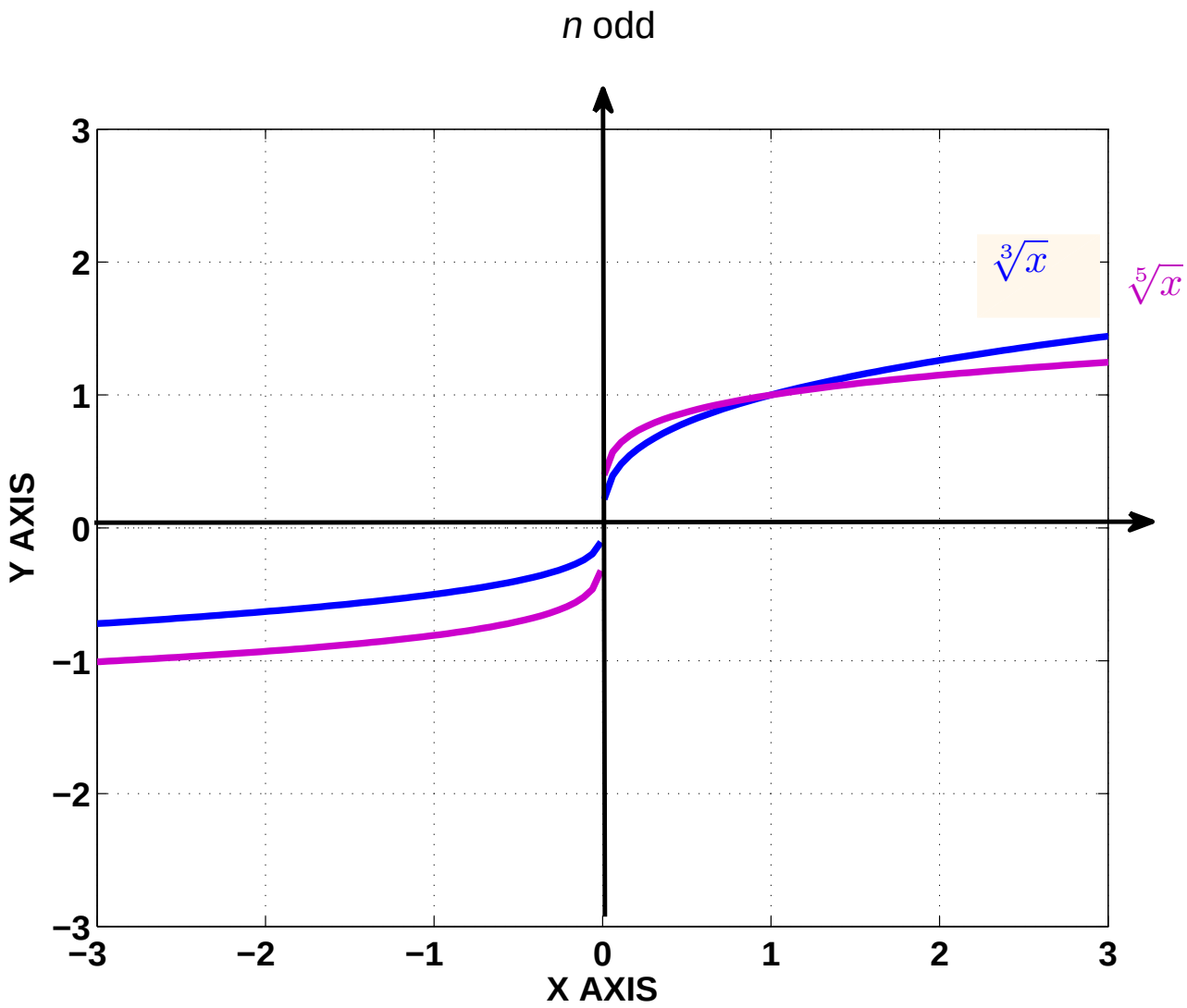

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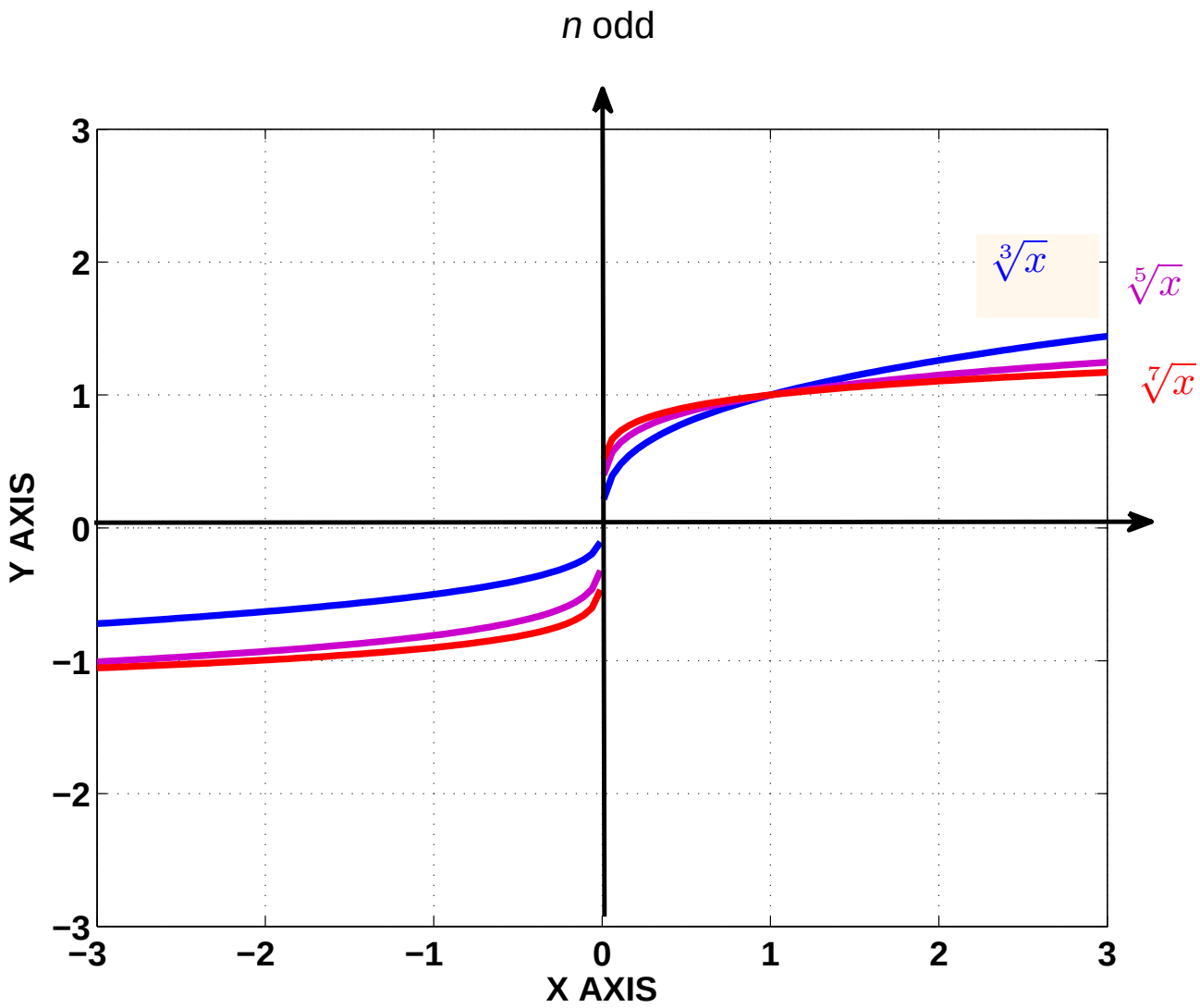

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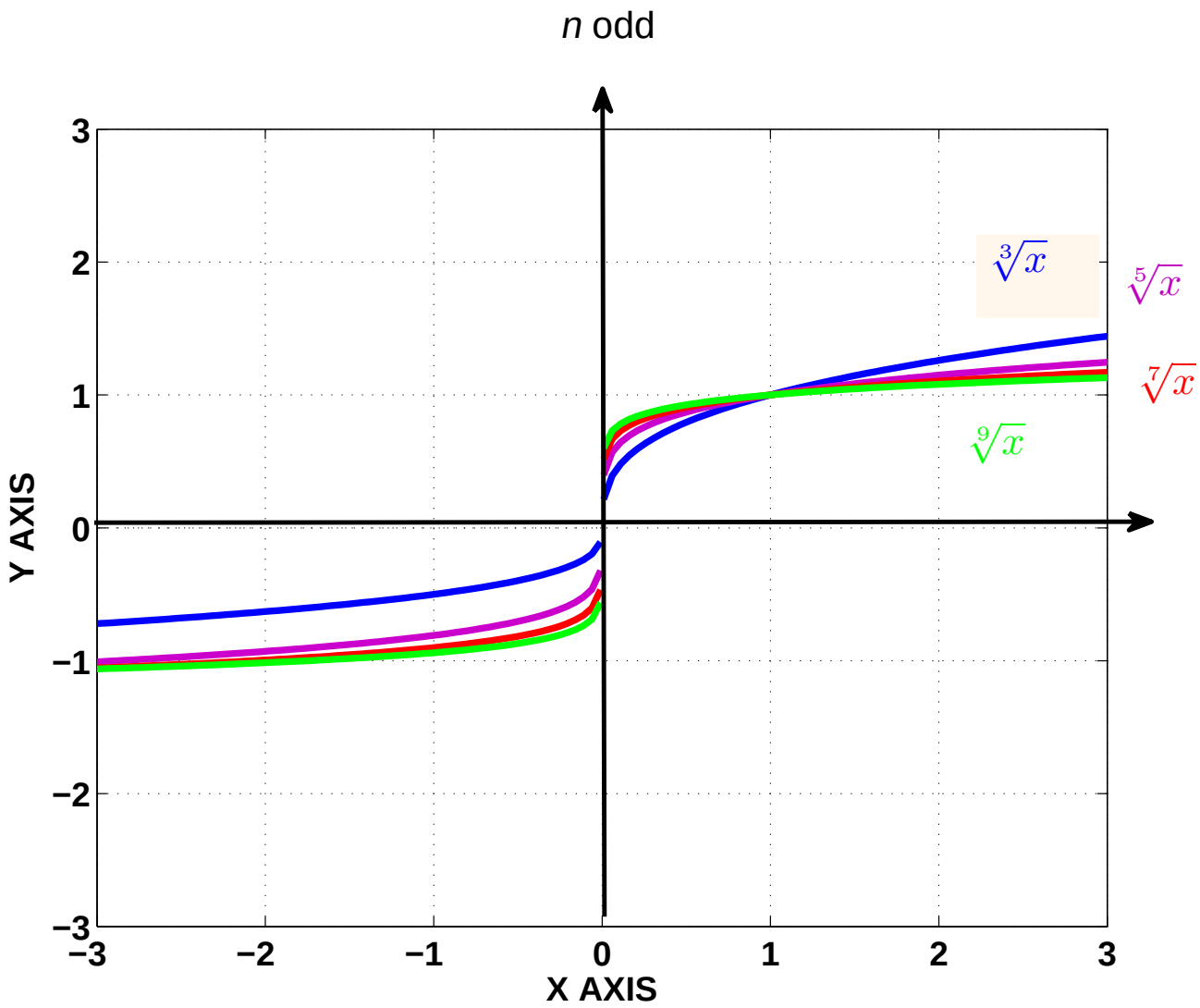
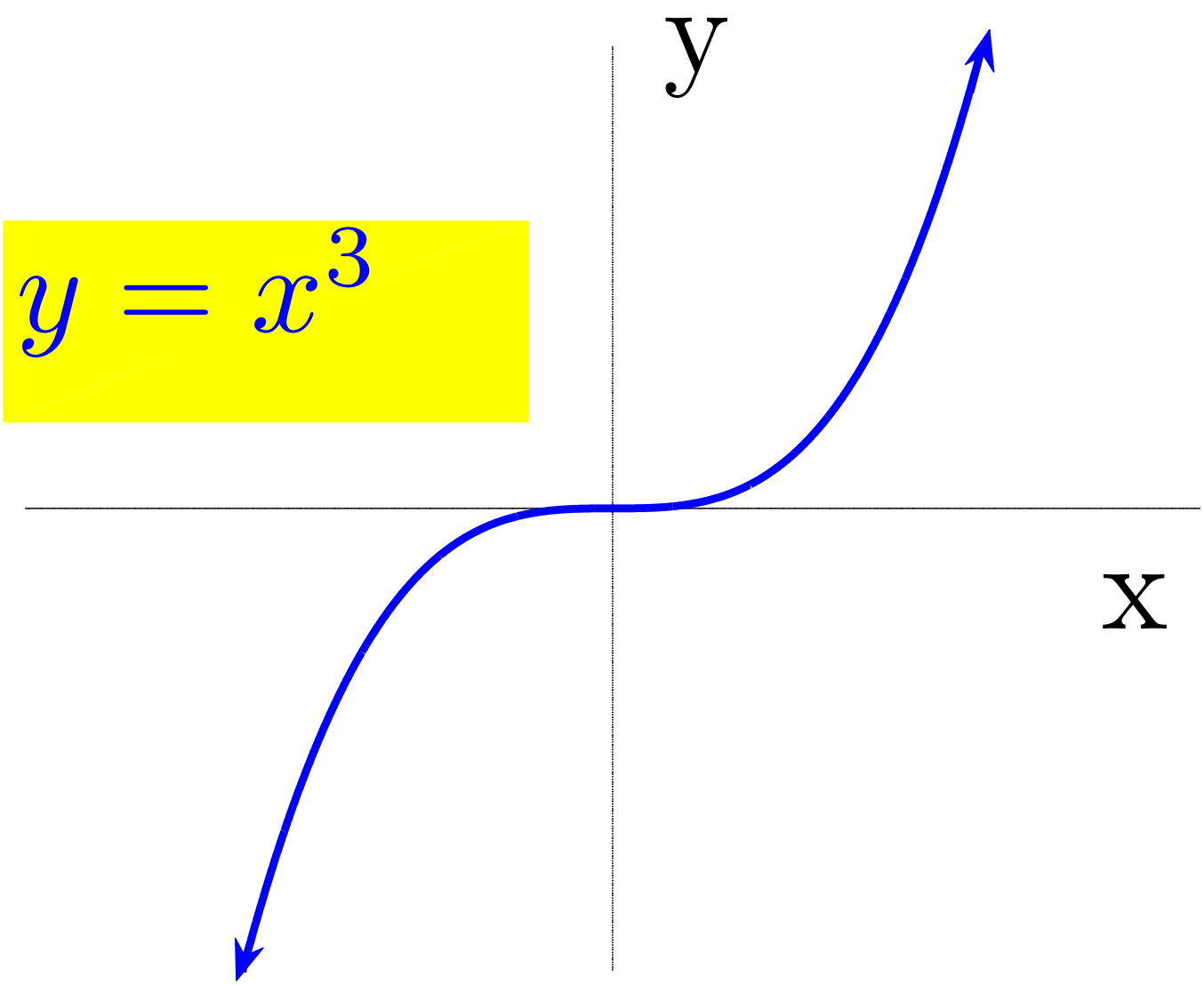
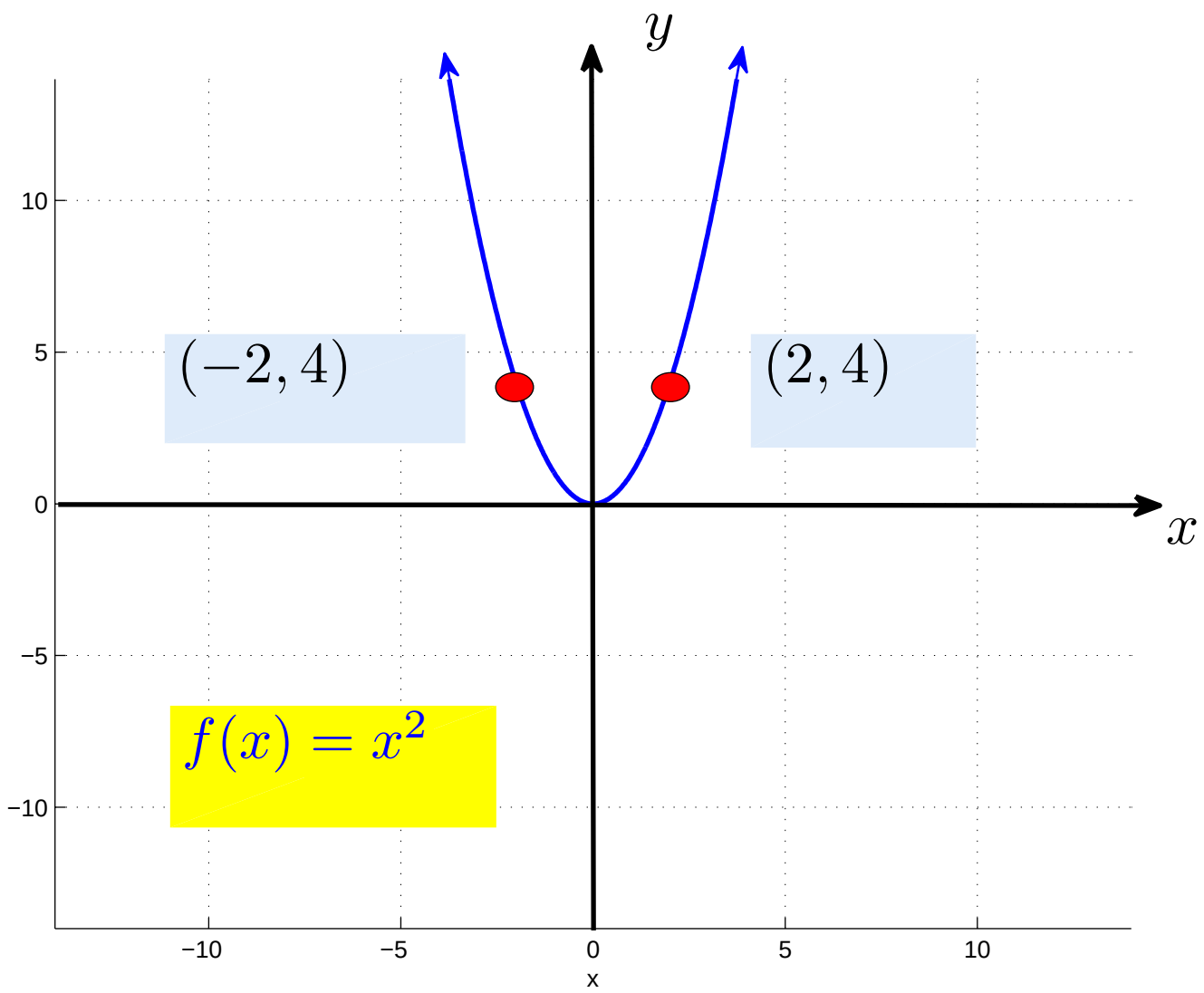


The graph of a function has origin symmetry when for any point (x,y) on the graph, there is also a point (-x,-y) on the graph.

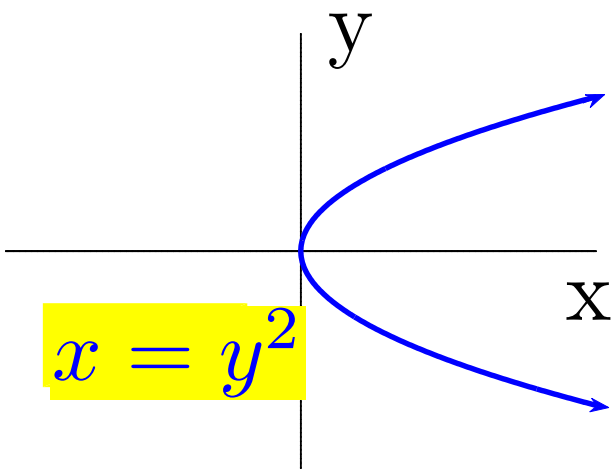


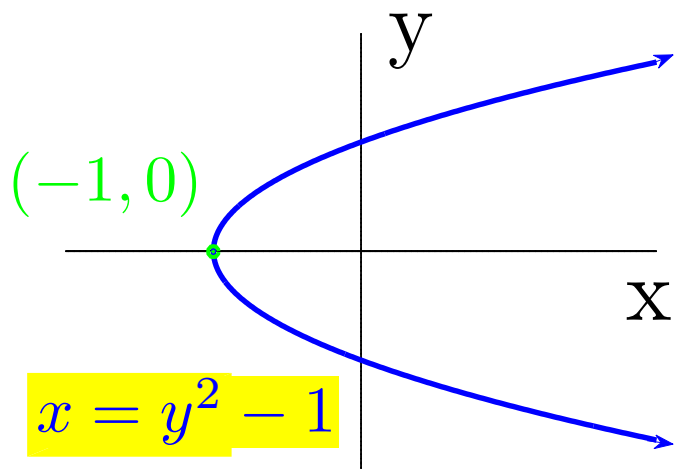
The graph of a function has y-axis symmetry if for every point (x,y), there is also a point (-x,y) on the graph.



Definition

The graph of a relation has x-axis symmetry if for every point (x, y) on the graph, the point $(x, -y)$ is also on the graph.





Can a function have x-axis symmetry?