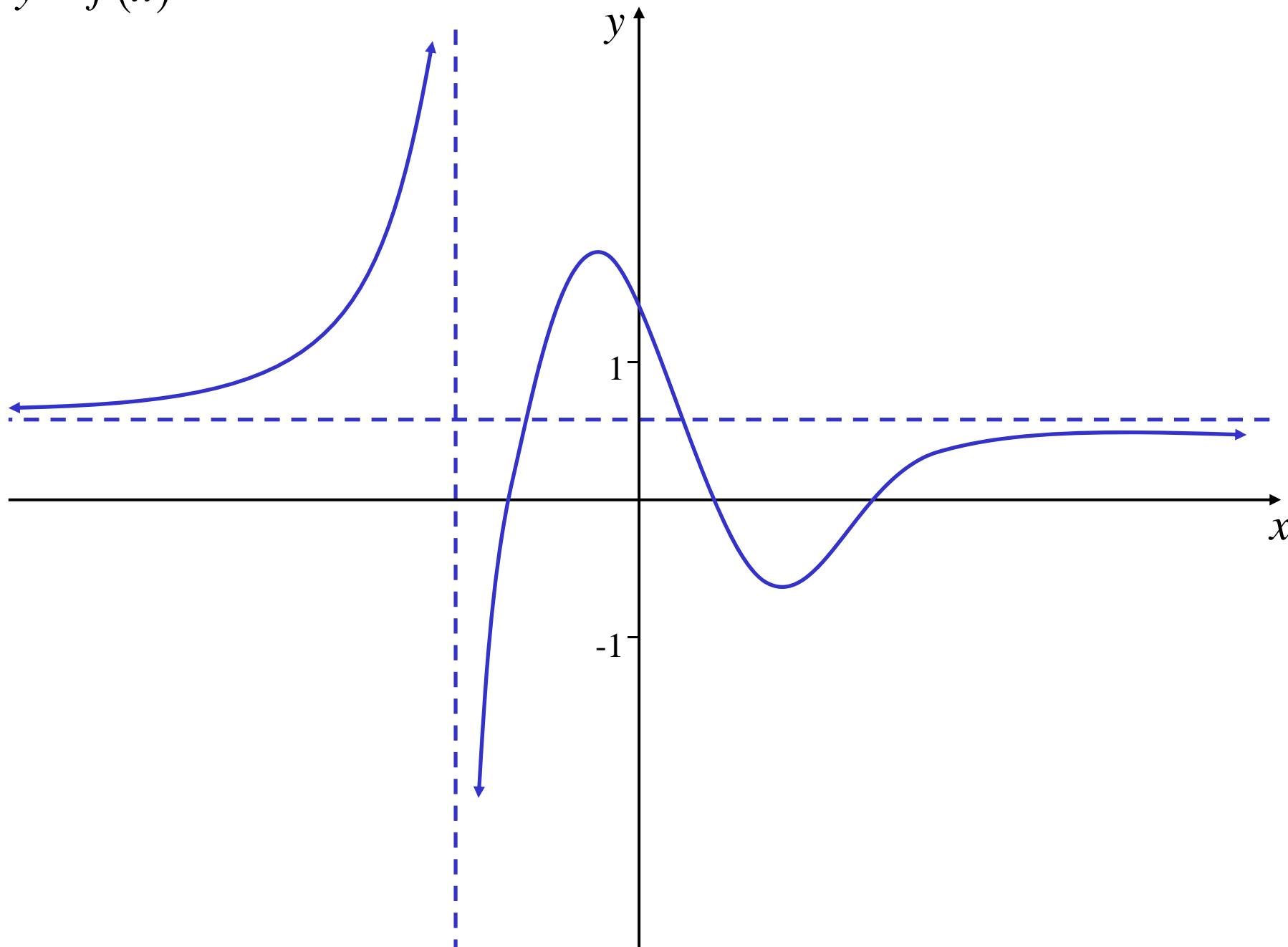


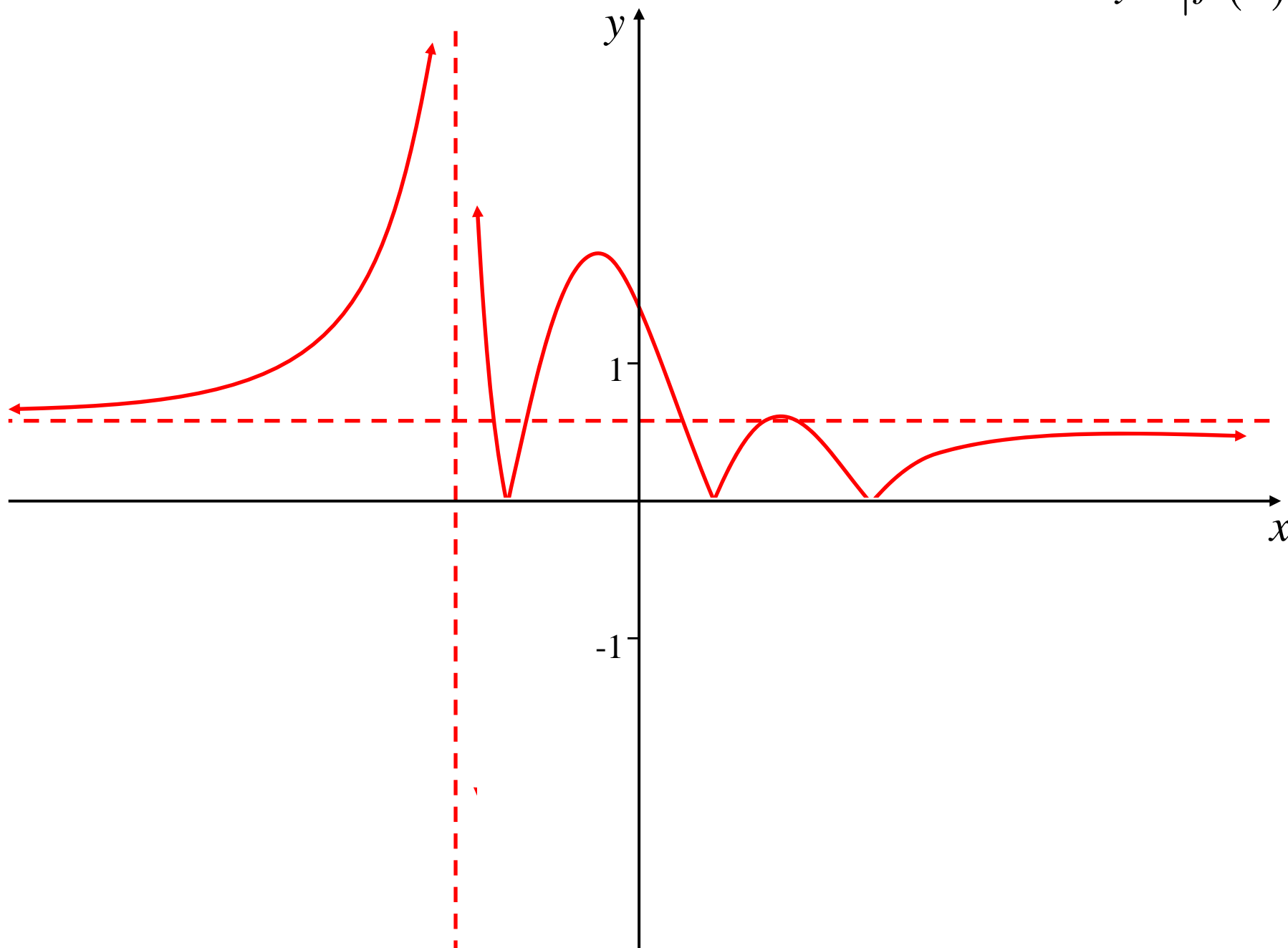
Graphs of Absolute Value Functions

- $y = |f(x)|$ (*reflection in the x axis*)
(*reflect the part of $f(x)$ where $f(x) < 0$ in the x axis*)
- $y = f(|x|)$ (*symmetry in the y axis*)
(*reflect the part of $f(x)$ where $x > 0$ in the y axis*)
- $|y| = f(x)$ (*symmetry in the x axis*)
(*reflect the part of $f(x)$ where $f(x) > 0$ in the x axis*)
- $|y| = f(|x|)$ (*symmetry in the x and y axes*)
(*reflect the part of $f(x)$ in the 1st quadrant into all four quadrants*)
- $y = |f(|x|)|$ (*symmetry in the y axis and reflection in the x axis*)
(*reflect the part of $f(x)$ where $x > 0$ in the y axis, then reflect result in the y axis*)
- $|y| = |f(x)|$ (*symmetry in the x axis and reflection in the x axis*)
(*reflect the part of $f(x)$ where $f(x) < 0$ in the x axis, then reflect result in the x axis*)

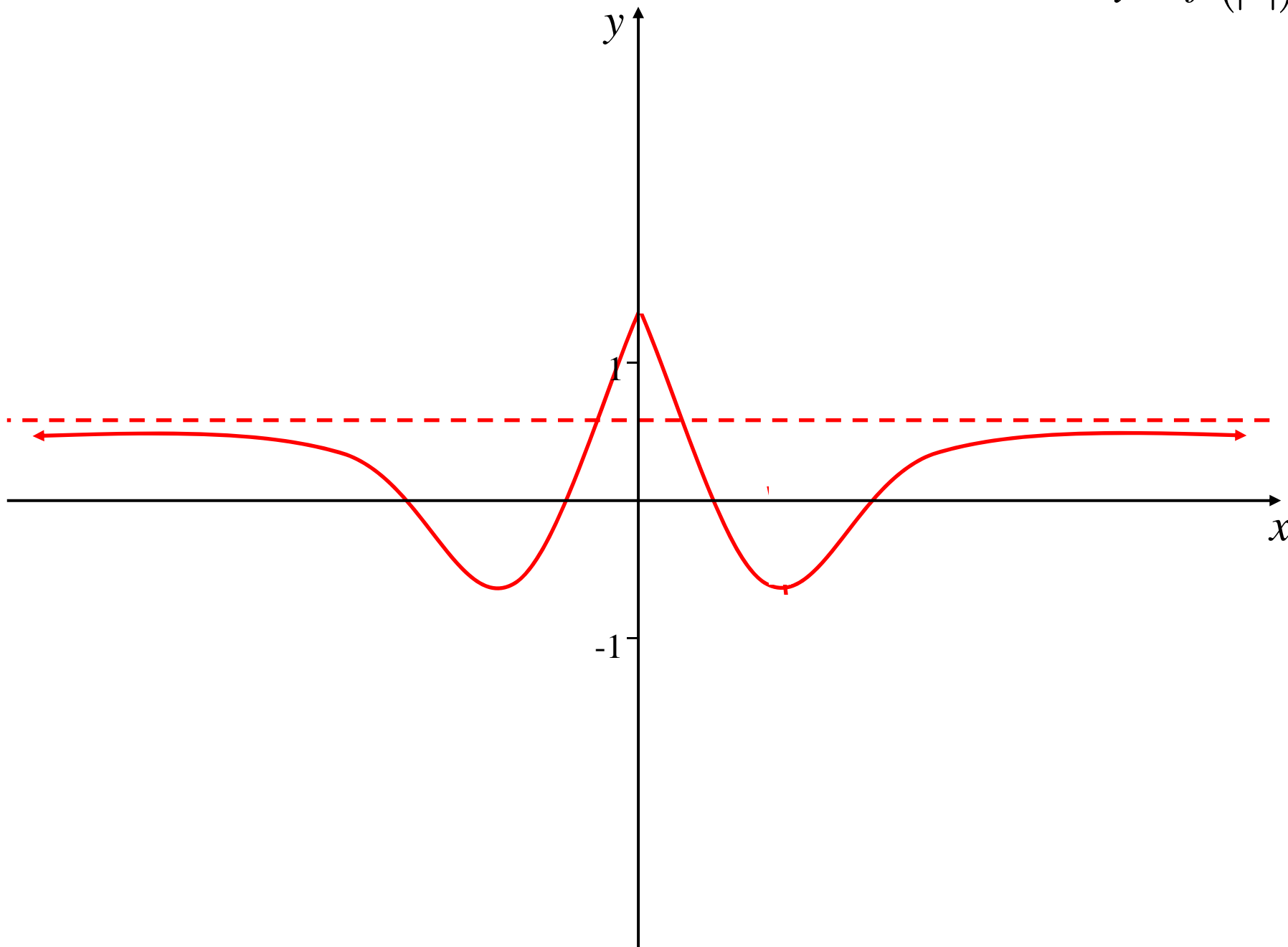
$$y = f(x)$$



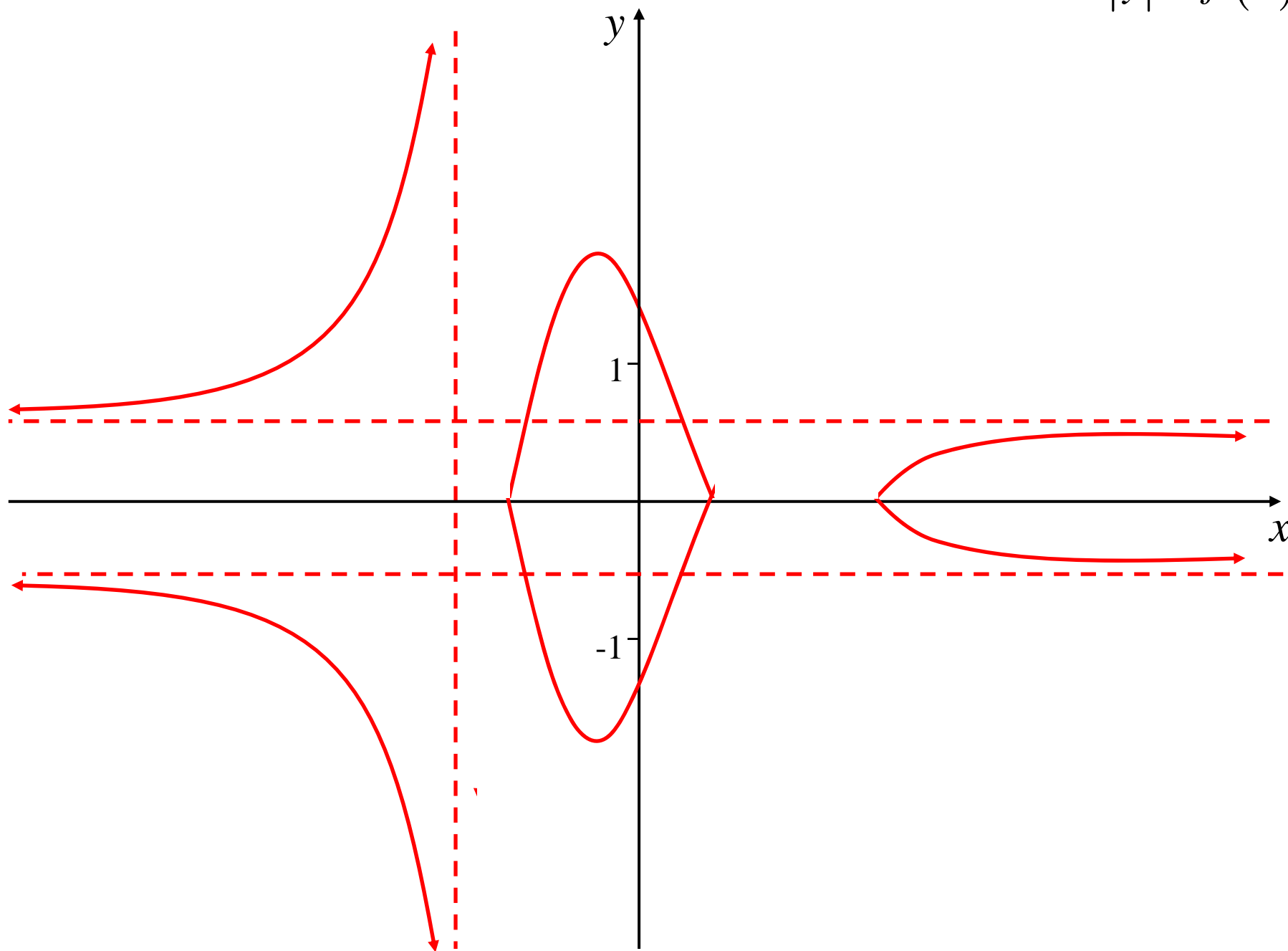
$$y = |f(x)|$$



$$y = f(|x|)$$

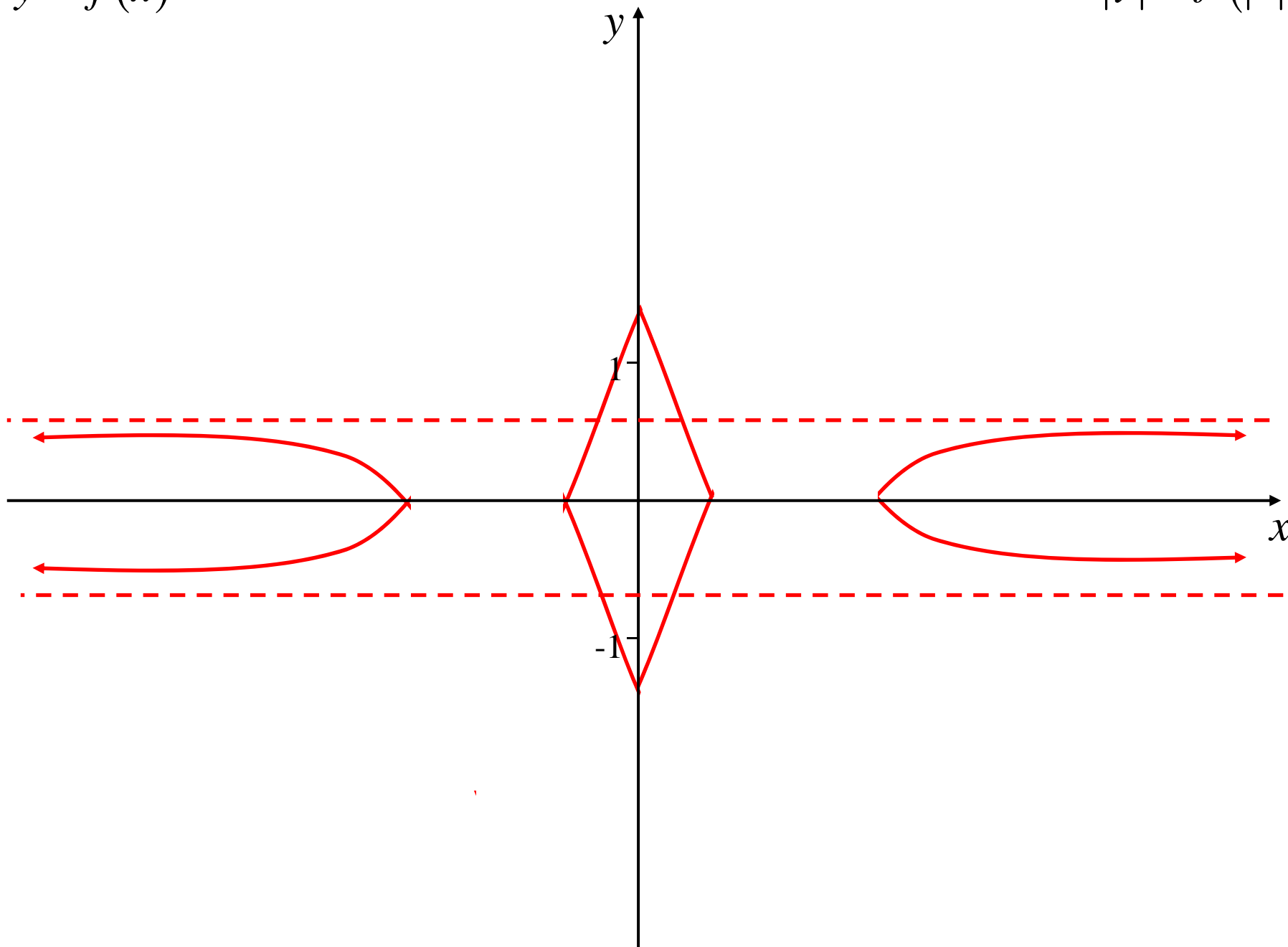


$$|y| = f(x)$$

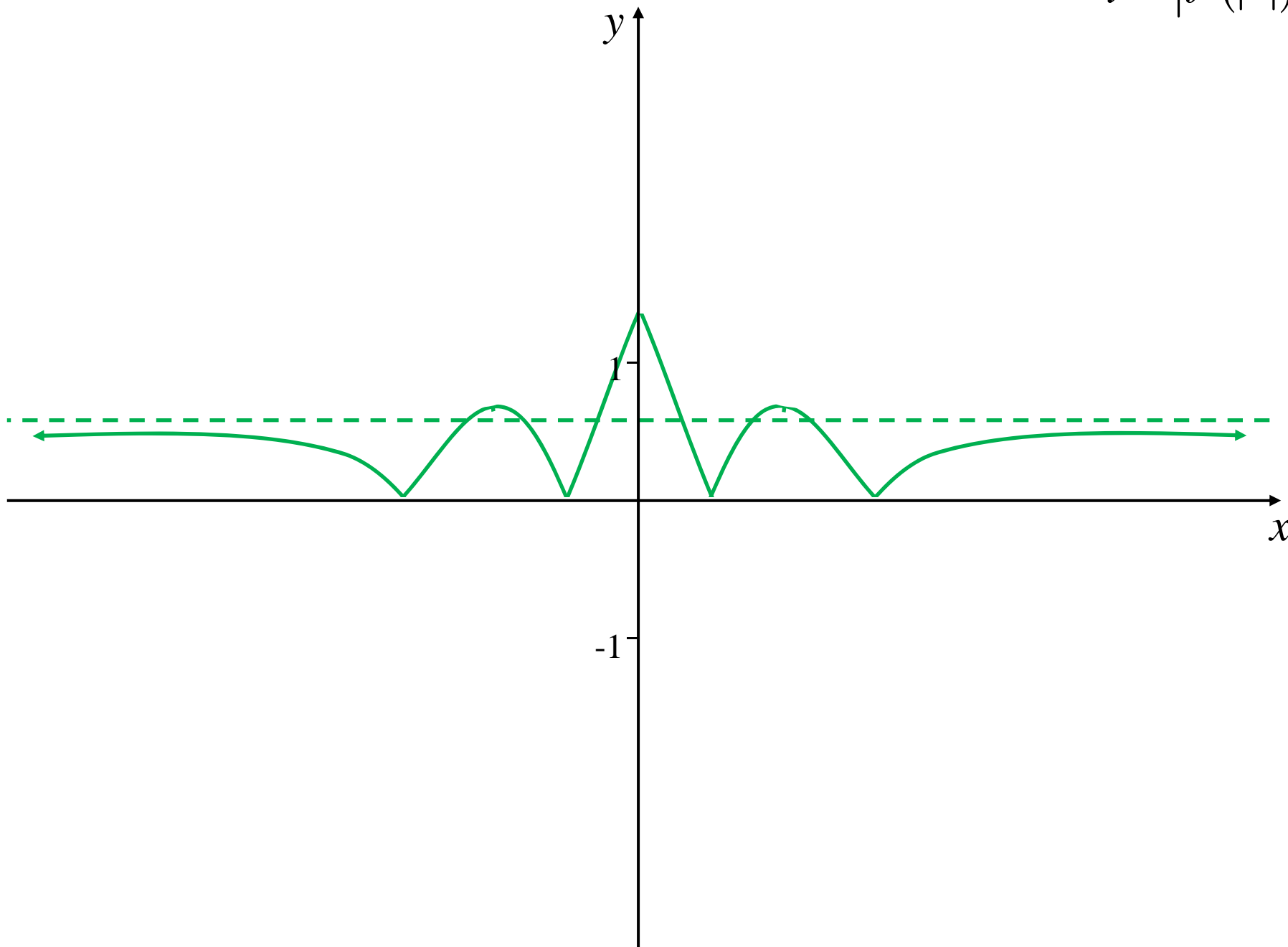


$$y = f(x)$$

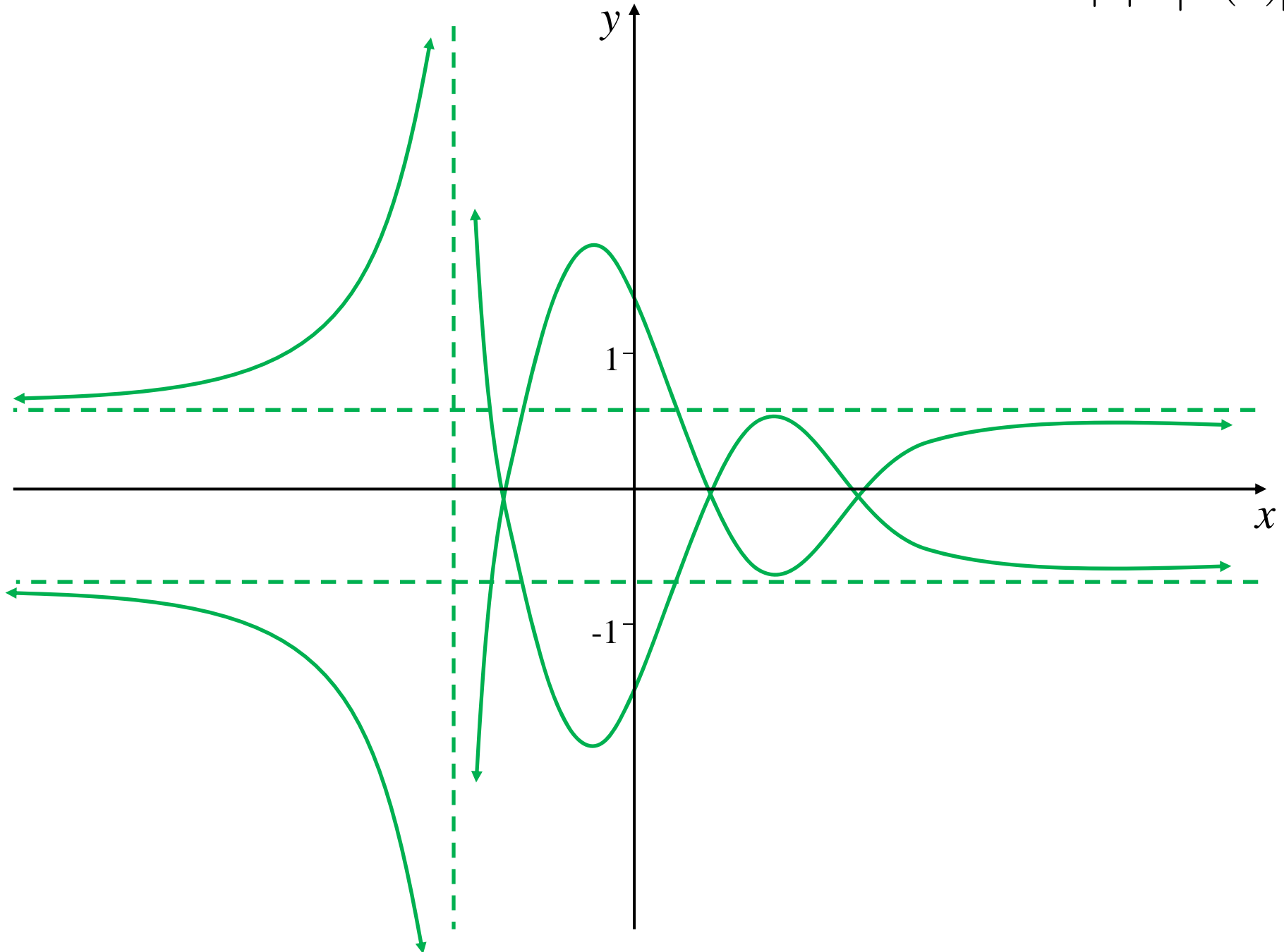
$$|y| = f(|x|)$$



$$y = |f(|x|)|$$



$$|y| = |f(x)|$$



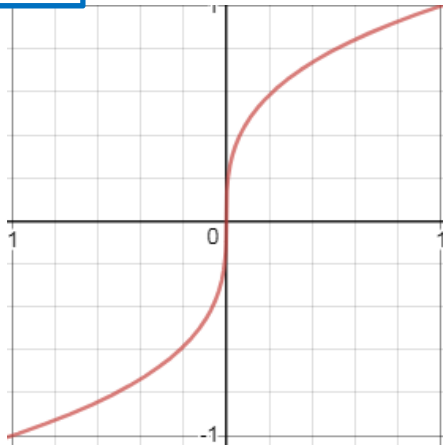
Graphs of the Form $y = \sqrt{f(x)}$

The graph of $y = \sqrt{f(x)}$ can be sketched by first drawing $y = f(x)$ and noticing;

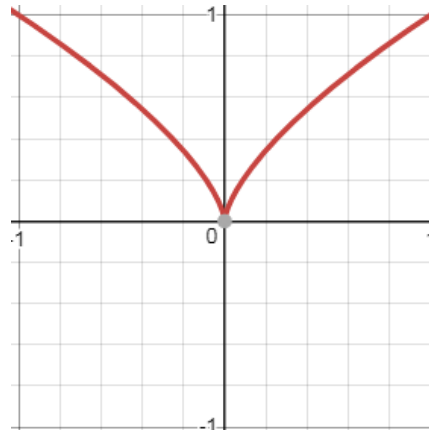
- $\sqrt{f(x)}$ is only defined if $f(x) \geq 0$
- $\sqrt{f(x)} \geq 0$ for all x in the domain
- $\sqrt{f(x)} < f(x)$ if $f(x) > 1$ i.e. new curve is below old curve
- $\sqrt{f(x)} > f(x)$ if $f(x) < 1$ i.e. new curve is above old curve
- stationary points must still be stationary points
- x intercepts require close inspection

$$y = x^{\frac{a}{b}}$$

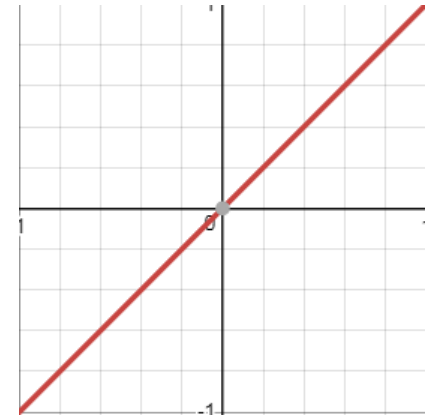
$$y = x^{\frac{1}{3}}$$



$$y = x^{\frac{2}{3}}$$

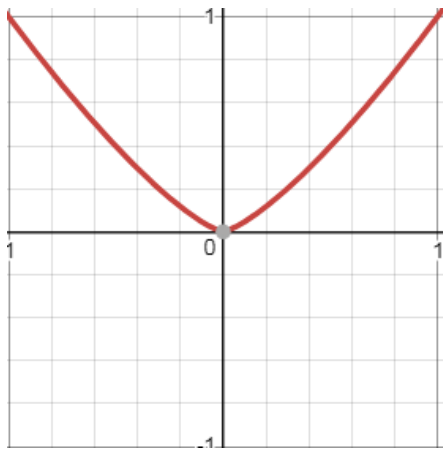


$$y = x^{\frac{3}{3}}$$

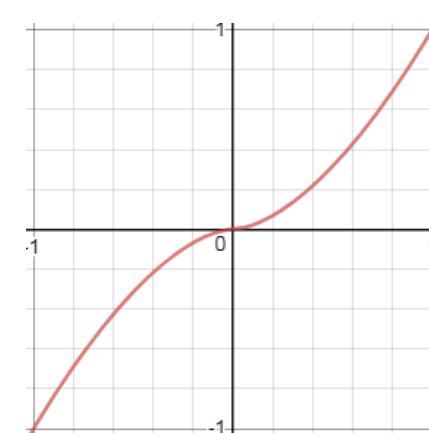


$\frac{a}{b} < 1$ curve is concave down in 1st quadrant (vertical tangent)

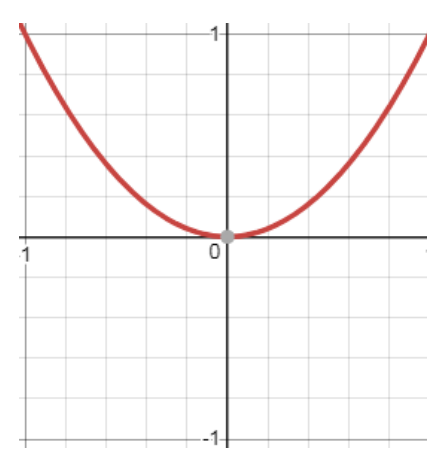
$$y = x^{\frac{4}{3}}$$



$$y = x^{\frac{5}{3}}$$



$$y = x^{\frac{6}{3}}$$



$\frac{a}{b} > 1$ curve is concave up in 1st quadrant (horizontal tangent)

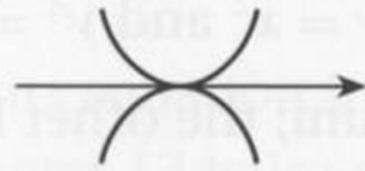
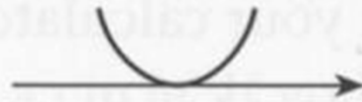
$f(x)$

Graph of $y = f(x)$

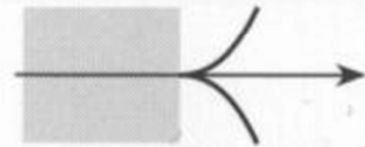
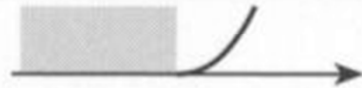
Graph of $y = \sqrt{f(x)}$

Shape of $y^2 = f(x)$

x^4



x^3



x^2



$x^{5/3}$



$x^{3/4}$



$$y = f(x)$$

