

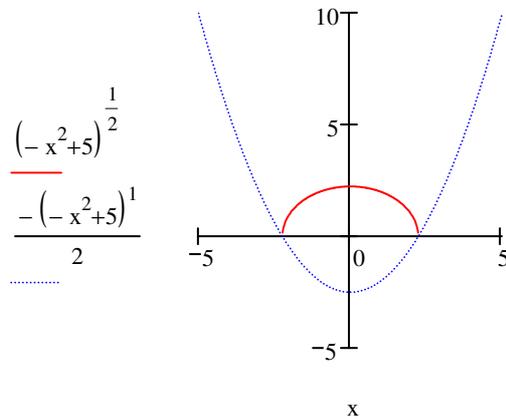
Die Graphen zur Übung 3:

1. Handelt es sich um eine Funktion ?

$$x^2 + y^2 = 5$$

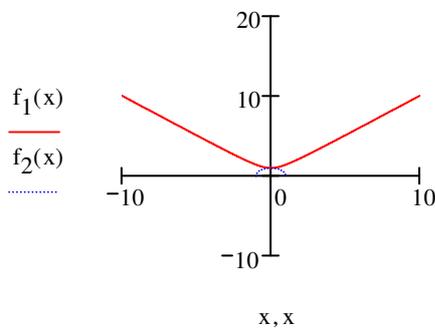
Auflösung nach y:

$$\begin{bmatrix} \frac{1}{2} \\ (-x^2 + 5)^{\frac{1}{2}} \\ -(-x^2 + 5)^{\frac{1}{2}} \\ \frac{1}{2} \end{bmatrix}$$



2 Lösungen, daher keine Eindeutigkeit!

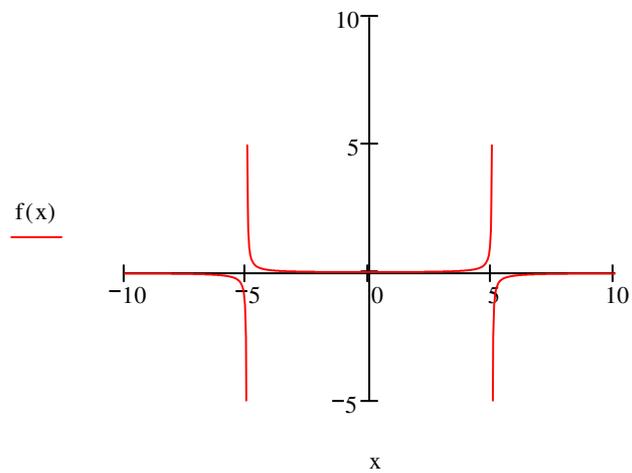
$$f_1(x) := \sqrt{1 + x^2} \quad f_2(x) := \sqrt{1 - x^2}$$



$f_1(x)$ ist Funktion, $f_2(x)$ nicht, weil für -Relle Zahlen nicht definiert !

Übung 3

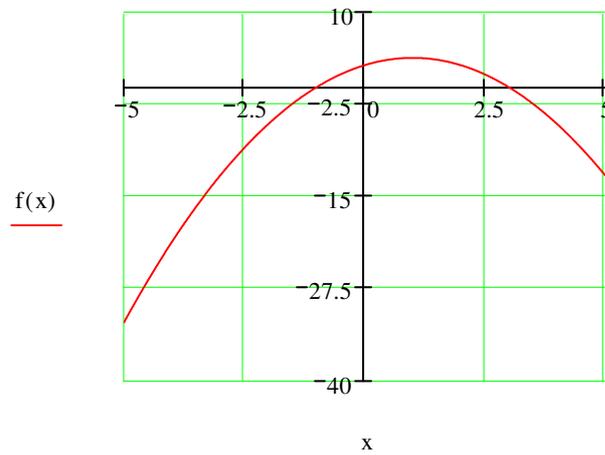
$$f(x) := \frac{1}{25 - x^2}$$



Ist Funktion, da sowohl von -5 bis +5 als auch im ganzen \mathbf{R} definiert

(2)

$$f(x) := -x^2 + 2 \cdot x + 3$$



Nullstellen

$$0 = -x^2 + 2 \cdot x + 3$$

$\begin{pmatrix} -1 \\ 3 \end{pmatrix}$...das sind die beiden Nullstellen

Übung 3

Umkehrfunktion:

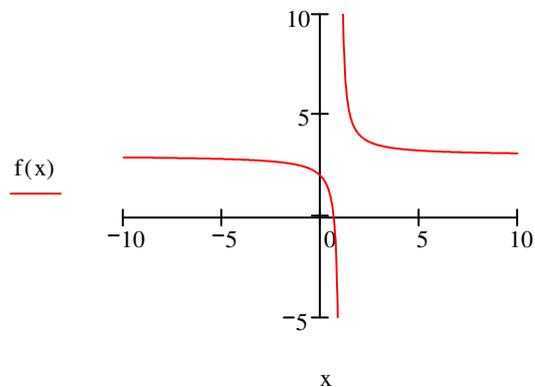
$$y = -x^2 + 2 \cdot x + 3$$

$$\left[\begin{array}{c} 1 + (4 - y)^{\frac{1}{2}} \\ 1 - (4 - y)^{\frac{1}{2}} \end{array} \right]$$

In \mathbb{R} definiert für $y \geq 4$

(4)

$$f(x) := \frac{3 \cdot x - 2}{x - 1}$$



Die Umkehrfunktion:

$$y = \frac{3 \cdot x - 2}{x - 1} \quad \frac{(y - 2)}{(y - 3)} = x \quad f^{-1}(y) = \frac{y - 2}{y - 3}$$

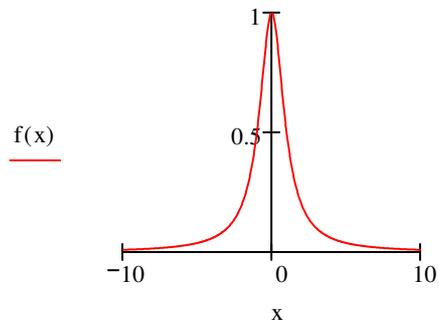
$$0 = \frac{3 \cdot x - 2}{x - 1} \quad 1 = \frac{3 \cdot x - 2}{x - 1} \quad -10 = \frac{3 \cdot x - 2}{x - 1}$$

$$x = \quad \frac{2}{3} \quad \quad \frac{1}{2} \quad \quad \frac{12}{13}$$

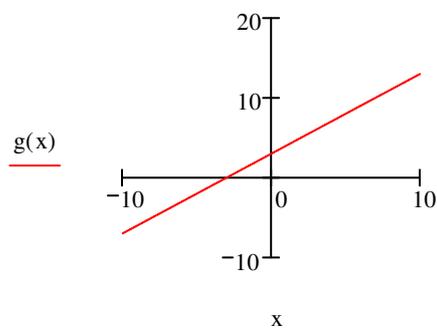
Übung 3

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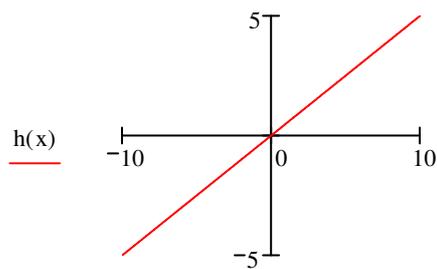
$$f(x) := \frac{1}{1+x^2}$$



$$g(x) := x + 3$$



$$h(x) := \frac{x}{2}$$



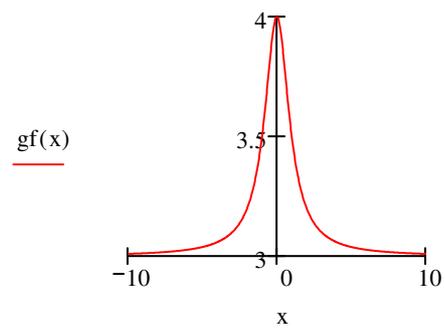
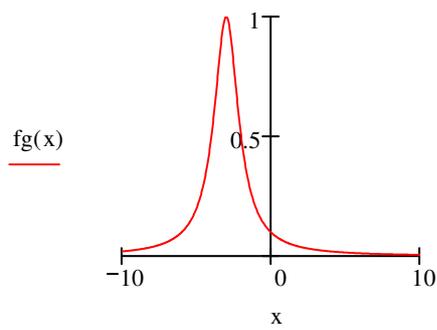
Übung 3

x

$f(x) \circ g(x) \dots fg(x)$

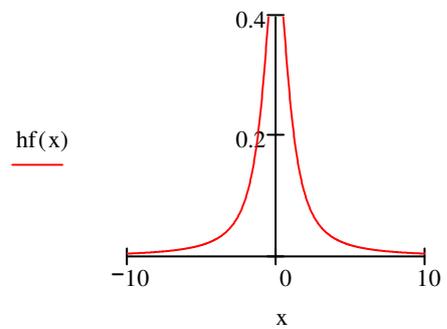
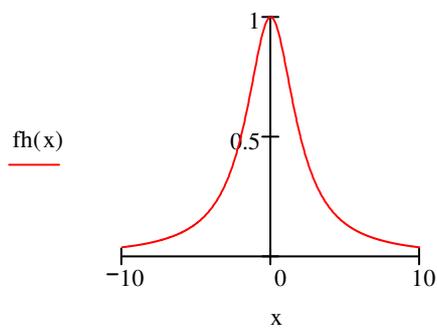
$$fg(x) := \frac{1}{1 + (x + 3)^2}$$

$$gf(x) := \frac{1}{1 + x^2} + 3$$



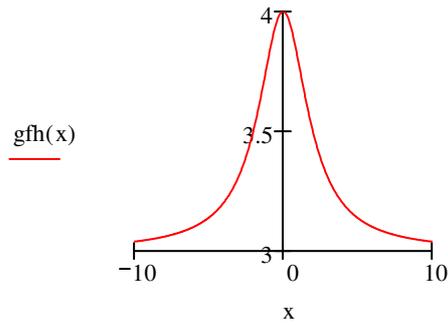
$$fh(x) := \frac{1}{1 + \left(\frac{x}{2}\right)^2}$$

$$hf(x) := \frac{1}{1 + x^2} + \frac{1}{2}$$

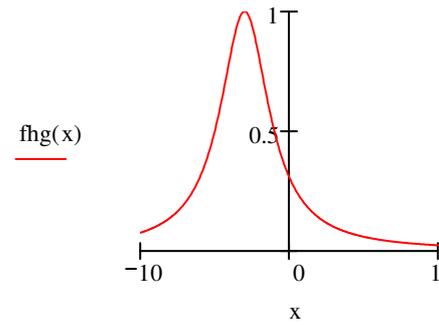


Übung 3

$$gfh(x) := \frac{1}{1 + \left(\frac{x}{2}\right)^2} + 3$$

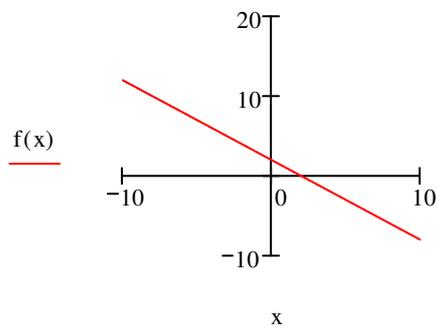


$$fhg(x) := \frac{1}{1 + \left(\frac{x+3}{2}\right)^2}$$

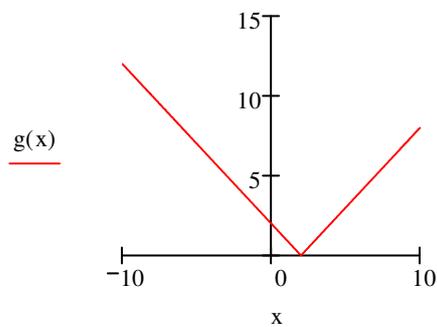


(5)

$$f(x) := 2 - x$$

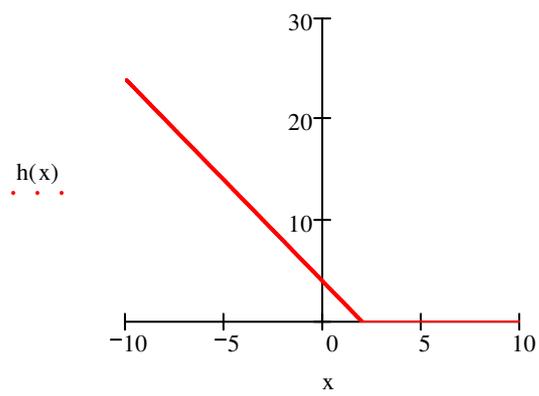


$$g(x) := |x - 2|$$



Übung 3

$$h(x) := 2 - x + |x - 2|$$



$$r(x) := |x + 3| - |x - 2|$$

