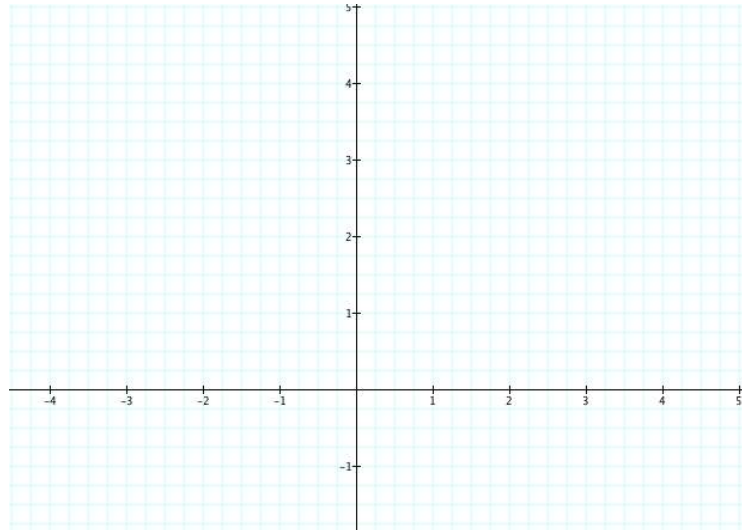


Die Betragsfunktion

Beispiel: $f(x) = \begin{cases} x & \text{für } x \geq 0 \\ -x & \text{für } x < 0 \end{cases}$

Graph:

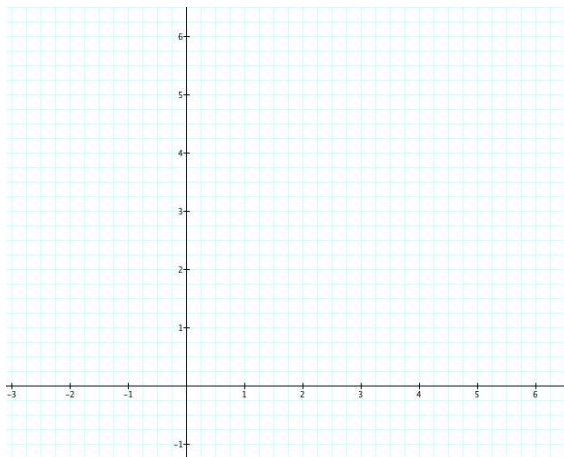


Definition:

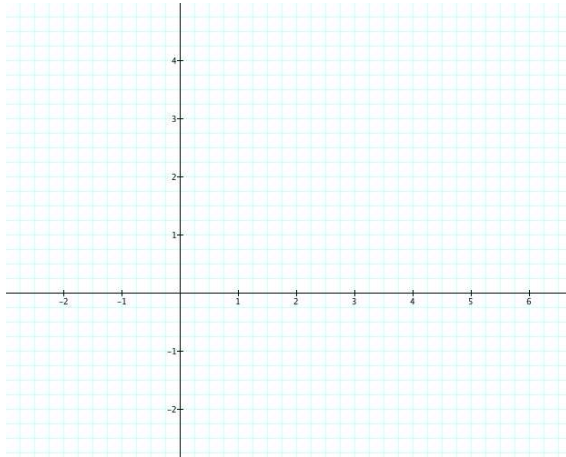
Die Funktion $f : x \mapsto |x| = \begin{cases} x & \text{für } x \geq 0 \\ -x & \text{für } x < 0 \end{cases}$ nennt man Betragsfunktion.

Aufgaben:

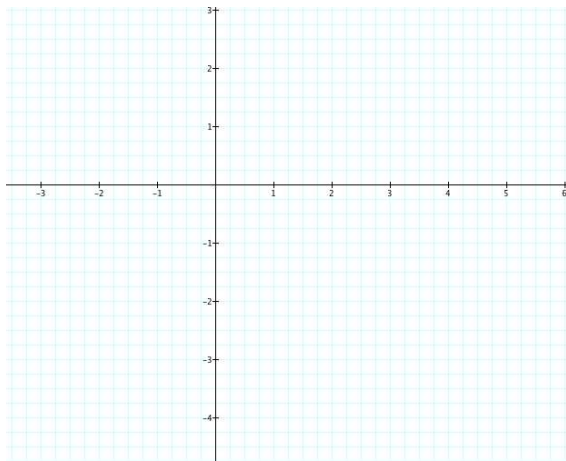
1) $f(x) = |2x - 6| =$



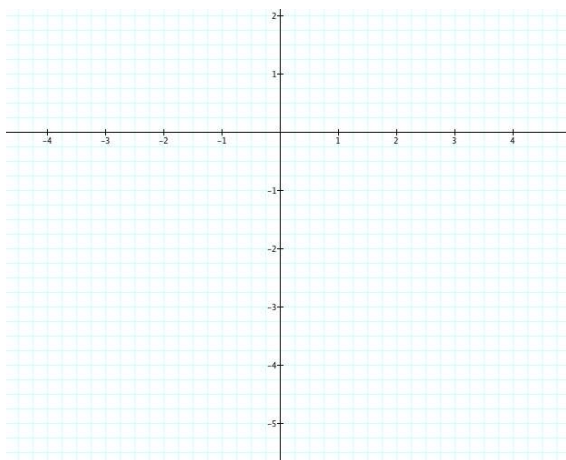
$$2) f(x) = |x - 1| - 2 =$$



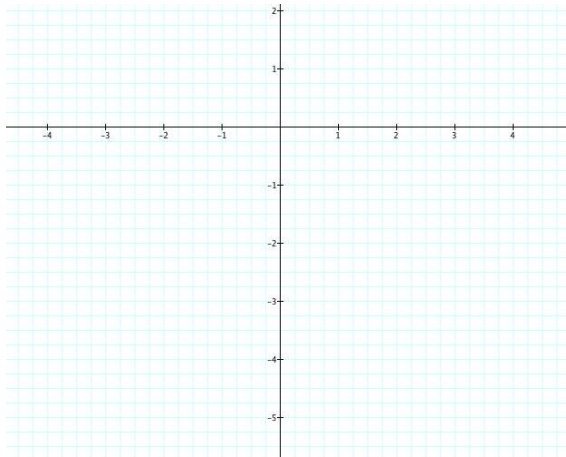
$$3) f(x) = \frac{1}{2}x - |x - 1| =$$



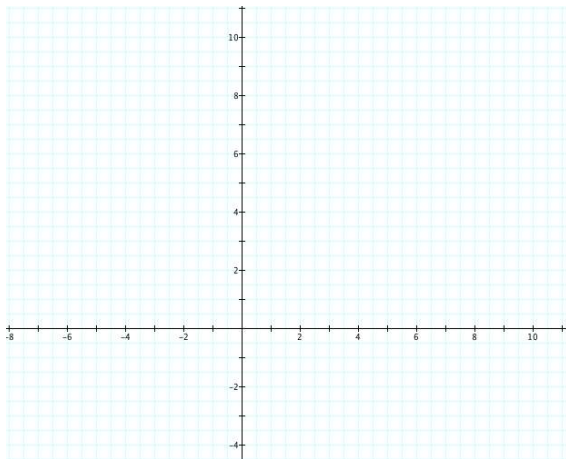
$$4) f(x) = 1 - 2 \cdot |x| =$$



$$5) f(x) = -|x| - 1 =$$



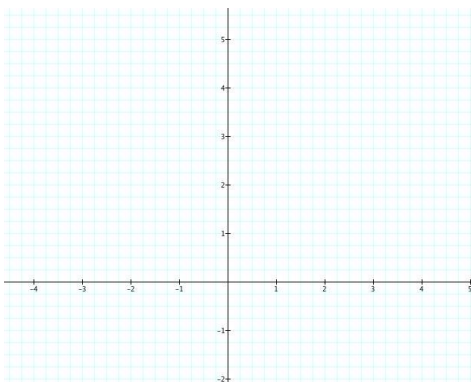
$$6) f(x) = 3x + 2 - |1 - x| =$$



7)

$$f(x) = \frac{|x| \cdot (x-1)}{2x} \quad D_f =$$

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

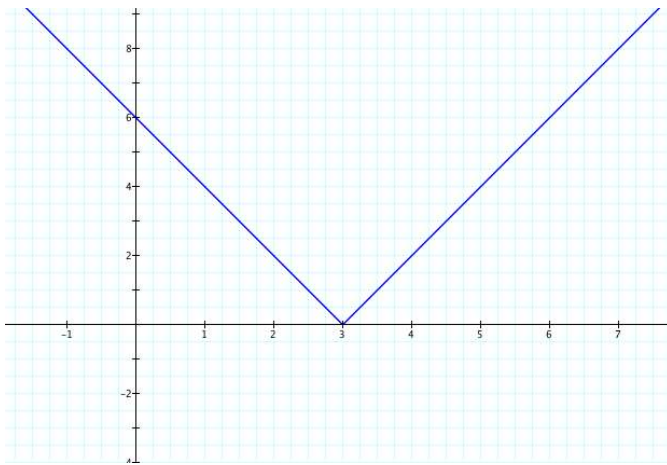


Lösungen:

1)

$$f(x) = |2x - 6| = \begin{cases} 2x - 6 & \text{für } 2x - 6 \geq 0 \\ -(2x - 6) & \text{für } 2x - 6 < 0 \end{cases}$$

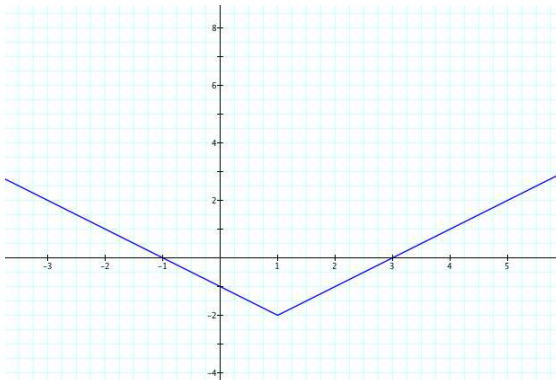
$$f(x) = \begin{cases} 2x - 6 & \text{für } x \geq 3 \\ -2x + 6 & \text{für } x < 3 \end{cases}$$



2)

$$f(x) = |x - 1| - 2 = \begin{cases} x - 1 - 2 & \text{für } x - 1 \geq 0 \\ -(x - 1) - 2 & \text{für } x - 1 < 0 \end{cases}$$

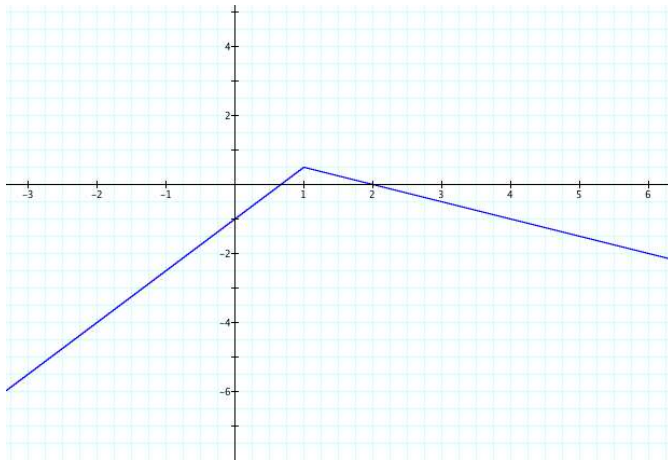
$$f(x) = \begin{cases} x - 3 & \text{für } x \geq 1 \\ -x - 1 & \text{für } x < 1 \end{cases}$$



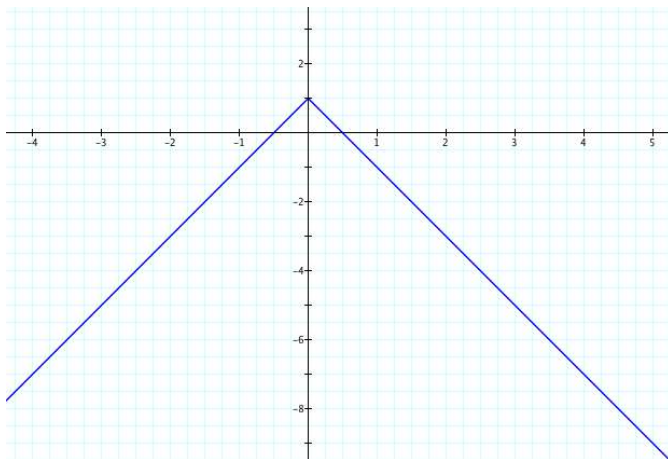
3)

$$f(x) = \frac{1}{2}x - |x-1| = \begin{cases} \frac{1}{2}x - (x-1) & \text{für } x-1 \geq 0 \\ \frac{1}{2}x + (x-1) & \text{für } x-1 < 0 \end{cases}$$

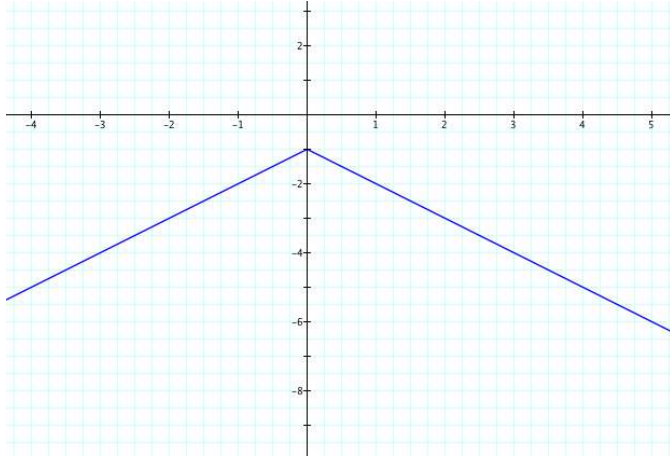
$$f(x) = \begin{cases} -\frac{1}{2}x + 1 & \text{für } x \geq 1 \\ \frac{3}{2}x - 1 & \text{für } x < 1 \end{cases}$$



$$4) f(x) = 1 - 2 \cdot |x| = \begin{cases} 1 - 2x & \text{für } x \geq 0 \\ 1 + 2x & \text{für } x < 0 \end{cases}$$



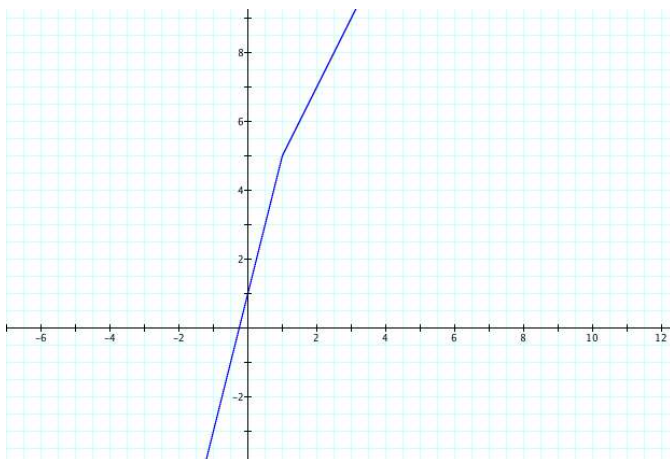
$$5) f(x) = -|x| - 1 = \begin{cases} -x - 1 & \text{für } x \geq 0 \\ x - 1 & \text{für } x < 0 \end{cases}$$



6)

$$f(x) = 3x + 2 - |1 - x| = \begin{cases} 3x + 2 - (1 - x) & \text{für } 1 - x \geq 0 \\ 3x + 2 + (1 - x) & \text{für } 1 - x < 0 \end{cases}$$

$$f(x) = \begin{cases} 4x + 1 & \text{für } x \leq 1 \\ 2x + 3 & \text{für } x > 1 \end{cases}$$



7)

$$f(x) = \frac{|x| \cdot (x-1)}{2x} \quad D_f = \mathbb{R} \setminus \{0\}$$

$$f(x) = \frac{|x| \cdot (x-1)}{2x} = \begin{cases} \frac{x \cdot (x-1)}{2x} & \text{für } x > 0 \\ \frac{-x \cdot (x-1)}{2x} & \text{für } x < 0 \end{cases}$$

$$f(x) = \begin{cases} 0,5x - 0,5 & \text{für } x > 0 \\ -0,5x + 0,5 & \text{für } x < 0 \end{cases}$$

