

3. Bestimme graph funktion!

$f(x) = :$

$f(x) = |x|$ *skizze* ; $|x-1|, |x+1|, |x|$

$f(x) = x^2$ *skizze* ; $-x^2, x^2+1, (x+1)^2, x^2+2x+2, x^2+3x+2,$
 $|x^2+3x+2|$

$f(x) = \sqrt{x}$ *skizze* ; $\sqrt{-x}, \sqrt{|x|}, \sqrt{x^2}, \sqrt{x-1}, \sqrt{x-1}$

$f(x) = \frac{1}{x}$ *skizze* ; $(-\frac{1}{x}), (\frac{1}{|x|}), \frac{1}{x+1}, \frac{1}{x}+1, \frac{x-2}{x+1}$

alle ; $\frac{1}{x^2}, (\frac{1}{(x+1)^2}), \frac{1}{x^2}+1, \frac{1}{x^2+1}, \frac{1}{x^2-1}$

$f(x) = e^x$ *skizze* ; $e^{-x}, |x|, e^{-|x|}, x^2, e^{-x^2}, x-2, \frac{1}{x}$
 e, e, e, e, e, e, e

$f(x) = \ln x$ *skizze* ; $\ln(-x), \ln|x|, |\ln x|, |\ln|x||,$
 $\ln \frac{1}{x}, \ln \frac{1}{|x|}, \ln(x+1), \ln x^2,$

$\ln \left(\frac{x+1}{x-2} \right)$

4. Bestimme, ge' skiz! $\log_a x = \frac{\log_b x}{\log_b a}$ (*spez.* $\log_a x = \frac{\ln x}{\ln a}$)

5. Answer! Funktion

lokale min / max & ge' f(x), Werte

$f(x) = x^2$ no intervalle $(-\infty, \infty)$

$f(x) = x^2 + 2x + 2$ no max. minimale intervalle

$f(x) = \frac{x-2}{x+1}$ no max. minimale intervalle

$f(x) = \frac{e^x + e^{-x}}{2}$ a $f(x) = \frac{e^x - e^{-x}}{2}$ no max/min minimale intervalle

6. opredelnite' absolutnu' hodnotu (v R):

(i) Ukaze, ze' pro libovolna' a, b, c ∈ R platit:

$$|a| = \max(a, -a)$$

$$a \leq c \wedge -a \leq c \Rightarrow |a| \leq c$$

$$|a+b| \leq |a|+|b|$$

$$|a-b| \leq |a|+|b|$$

$$||a|-|b|| \leq |a-b|$$

$$|a-b| \leq |a-c|+|c-b|$$

$$|a \cdot b| \leq \frac{1}{2}(a^2+b^2)$$

(ii) Ukaze, ze' d(a, b) Antet' a, b v R delimivne:

$$d(a, b) = |b-a| = |a-b|, \quad a, b \in \mathbb{R}$$

Ukaze, ze' pro libovolna' a, b, c ∈ R platit:

$$d(a, b) \geq 0, \quad d(a, b) = 0 \Leftrightarrow a = b$$

$$d(a, b) = d(b, a)$$

$$d(a, b) \leq d(a, c) + d(c, b) \quad (\text{trojuhelnikova' nerovnost})$$

(iii) Nerovnice s absolutnu' hodnotou:

v R ritse nerovnice, resp. nerovny nerovnic:

a) $|x-2| \leq 1$

e) $\left| \frac{x+1}{x-1} \right| \leq 1$

b) $|x+3| > 4$

c) $|x-1| < 3 \wedge |x+2| \geq 4$ f) $|x^2+2x-3| \geq |x^2+3x-4|$

d) $|x-1| < |x+5|$

