1. test 2B

(1) $|x + |x+2|| < 4x$

(a) $x + 2 \geq 0$

$x \geq -2$

$|x + x + 2| < 4x$

$|2(x+1)| < 4x$

(a.1) $x+1 \geq 0$

$x \geq -1$

$2x + 2 < 4x$

$2 < 2x$

$1 < x$

(a.2) $x+1 < 0$

$x < -1$

$-2x - 2 < 4x$

$-2 < 6x$

$-\frac{1}{3} < x$

nelze

(b) $x + 2 < 0$

$x < -2$

$|x - x - 2| < 4x$

$|-2| < 4x$

$2 < 4x$

$\frac{1}{2} < x$

nelze

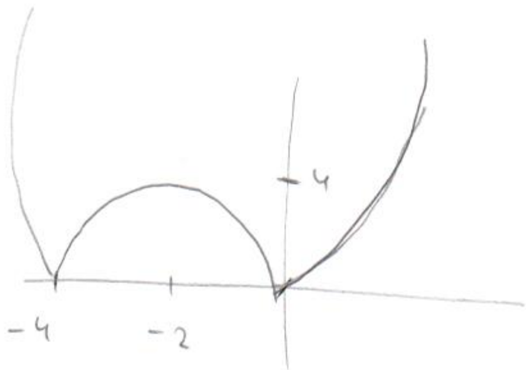
Závěr $x > 1$

(2) $|x^2+4x|<a$

- $a<0$ $\emptyset$

- $x^2+4x=0$

  $x(x+4)=0$



(a) $x^2+4x>0$

$x^2+4x<a$

$x^2+4x-a<0$

$x\in(-\infty,-4)\cup(0,\infty)$

$x_{1,2}=\dfrac{-4\pm\sqrt{16+4a}}{2}$

(b) $x^2+4x<0$

$-x^2-4x<a$

$0<x^2+4x+a$

$x\in(-4,0)$

$x_{1,2}=\dfrac{-4\pm\sqrt{16-4a}}{2}$

$16-4a>0$
$4>a$

(1) $a<0$ $\emptyset$

(2) $a=0$ $\emptyset$

(3) $a\in(0,4)$ $x\in(-2-\sqrt{4+a},-4)\cup(0,-2+\sqrt{4+a})$
$\cup[-4,-2-\sqrt{4-a})\cup(-2+\sqrt{4-a},0]$
$=(-2-\sqrt{4+a},-2-\sqrt{4-a})\cup(-2+\sqrt{4-a},-2+\sqrt{4+a})$

(4) $a=4$ $x\in(-2-\sqrt{8},-2+\sqrt{8})\setminus\{-2\}$

(5) $a>4$ $x\in(-2-\sqrt{4+a},-2+\sqrt{4+a})$

(3) $f(x,y,z) = \arctan(x+y+z) + \cos(x+yz)$

$$\frac{\partial f}{\partial x} = \frac{1}{1+(x+y+z)^2} + (-\sin(x+yz))$$

$$\frac{\partial f}{\partial y} = \frac{1}{1+(x+y+z)^2} + (-\sin(x+yz)) \cdot z$$

$$\frac{\partial f}{\partial z} = \frac{1}{1+(x+y+z)^2} + (-\sin(x+yz)) \cdot y$$