

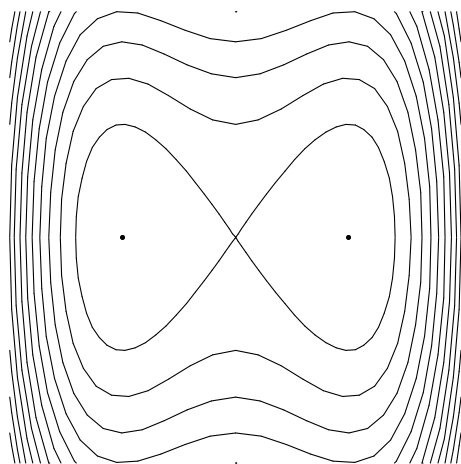
# Mały atlas poziomic

Przyporządkować szkicom poziomic funkcji dwóch zmiennych podane wzory.

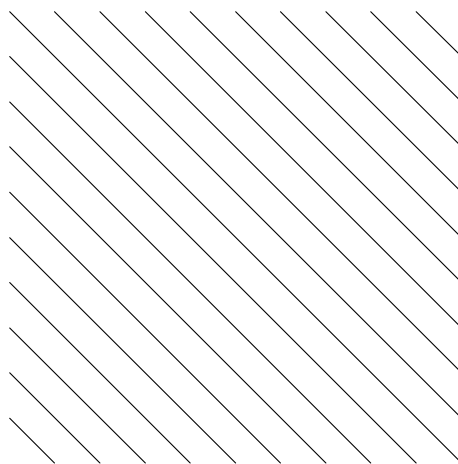
Jednostki na obu osiach są takie same, ale mogą być różne na różnych rysunkach, kierunki osi są standardowe, początek układu współrzędnych leży w środku rysunku, naszkicowane są wszystkie poziomicie odpowiadające całkowitym wartościom funkcji.

*Jarosław Wróblewski*

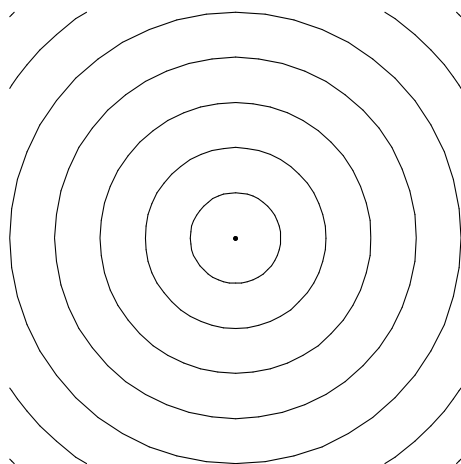
1.  $f(x, y) = x^2 + y^2$
2.  $f(x, y) = x^2 + y^2 + xy$
3.  $f(x, y) = x^2 + y^2 + 2xy$
4.  $f(x, y) = x^2 + y^2 + 3xy$
5.  $f(x, y) = xy$
6.  $f(x, y) = x^2 - y^2$
7.  $f(x, y) = x + y$
8.  $f(x, y) = \sqrt{x^2 + y^2}$
9.  $f(x, y) = \sqrt{x^4 + y^4}$
10.  $f(x, y) = \sqrt[4]{x^2 + y^2}$
11.  $f(x, y) = x^2 + y^2 + 2x$
12.  $f(x, y) = x^2 + y^2 + 2xy + x - y$
13.  $f(x, y) = y^2 - |x|$
14.  $f(x, y) = x^2 + 4y^2$
15.  $f(x, y) = \sqrt[4]{x^4 + y^4}$
16.  $f(x, y) = x^4 + y^4 + xy$
17.  $f(x, y) = x^4 + y^4 + 4xy$
18.  $f(x, y) = y^3 - 3x^2y$
19.  $f(x, y) = x^4 - 2x^2 + y^2$
20.  $f(x, y) = x^4 - 2x^2 - y^2$
21.  $f(x, y) = x^4 - 2x^2 + y^4 - 2y^2$
22.  $f(x, y) = x^4 - 2x^2 - y^4 + 2y^2$
23.  $f(x, y) = x^3 - 3x + y^3 - 3y$
24.  $f(x, y) = x^3 + y^2$



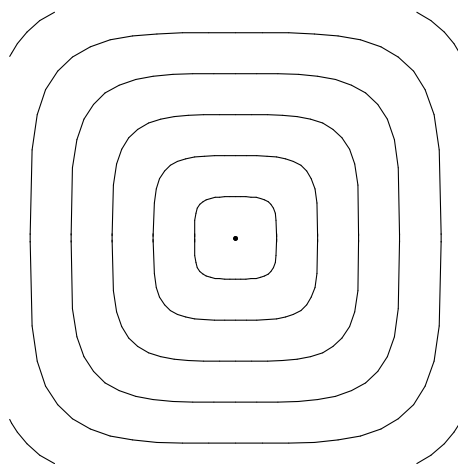
rys. 1



rys. 2

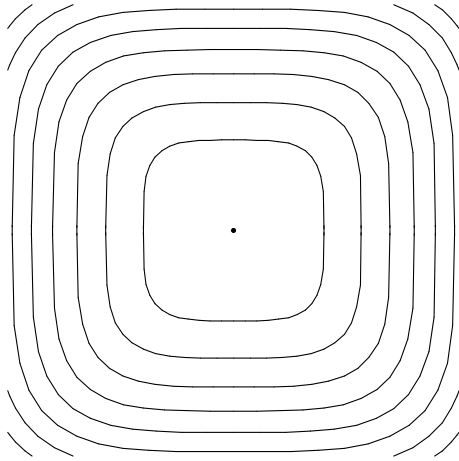


rys. 3

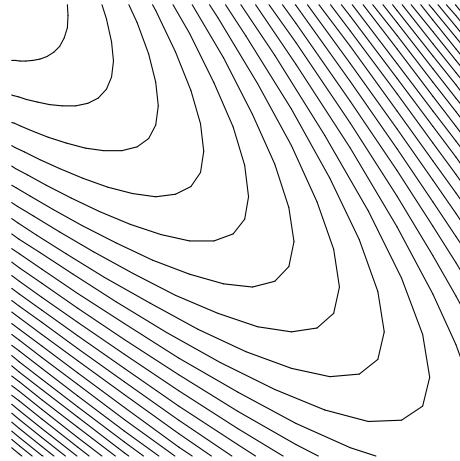


rys. 4

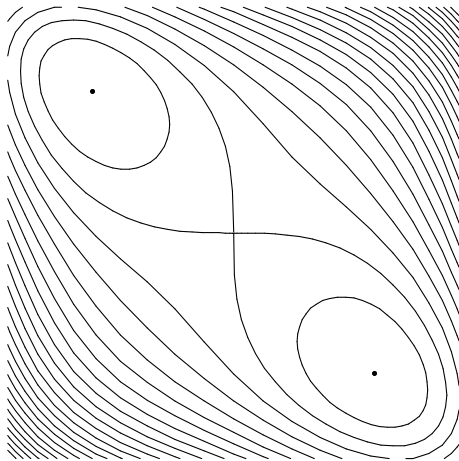
*Jarosław Wróblewski*



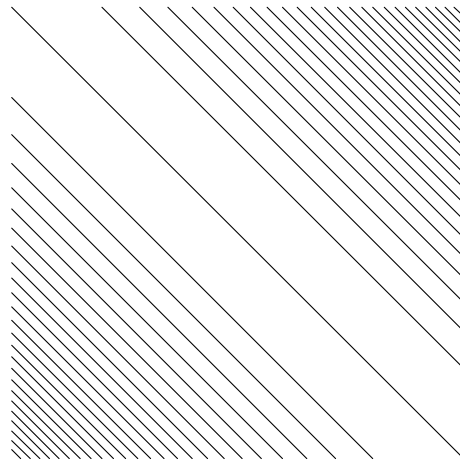
rys. 5



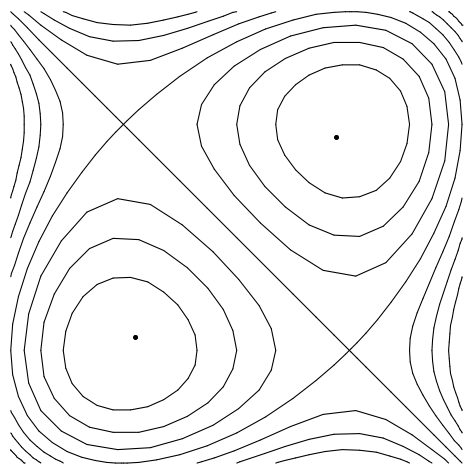
rys. 6



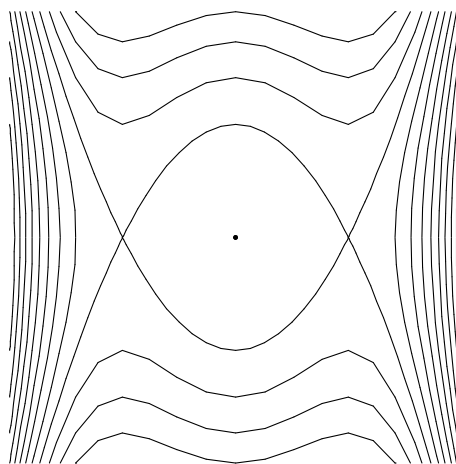
rys. 7



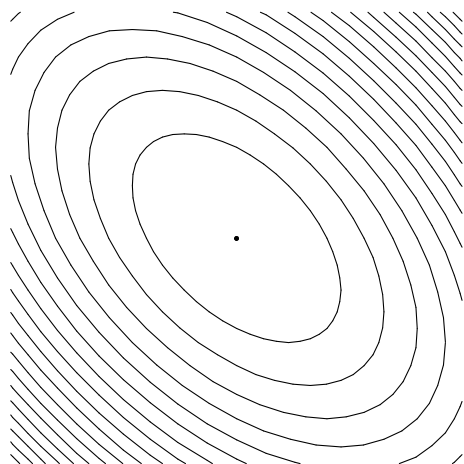
rys. 8



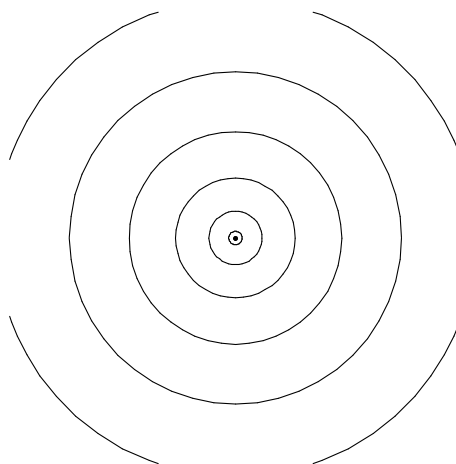
rys. 9



rys. 10

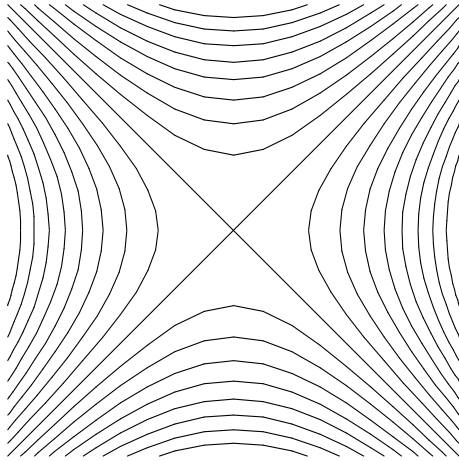


rys. 11

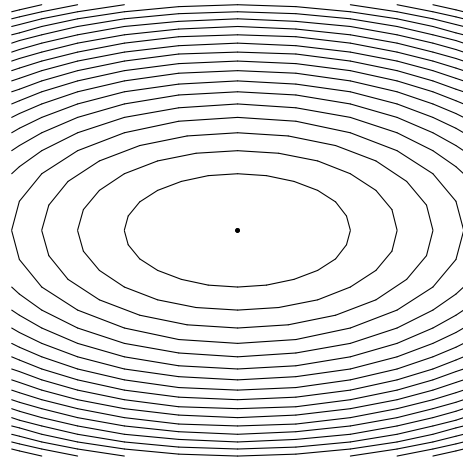


rys. 12

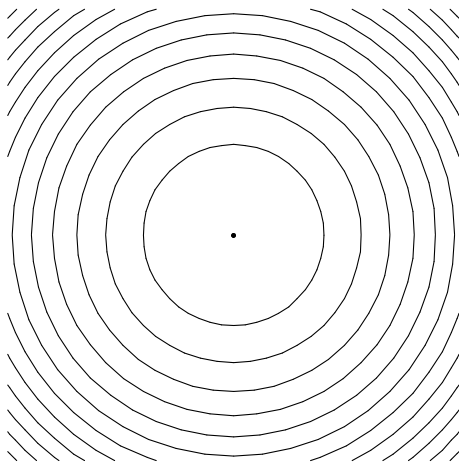
*Jarosław Wróblewski*



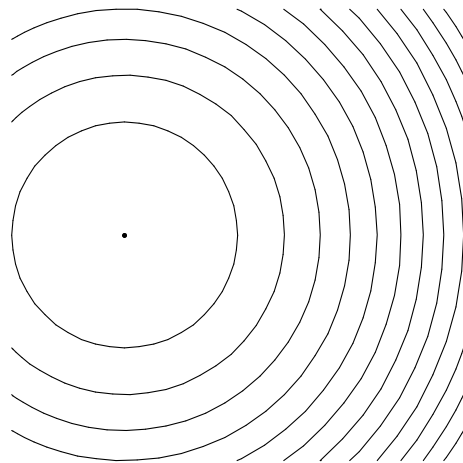
rys. 13



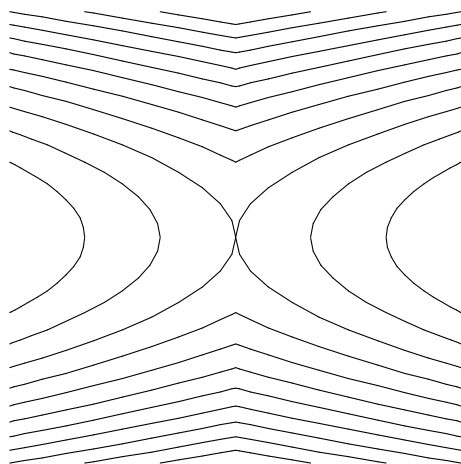
rys. 14



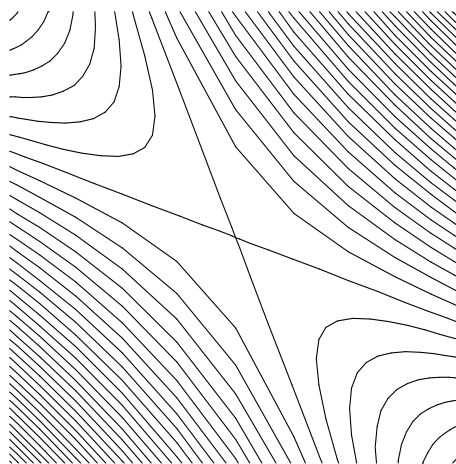
rys. 15



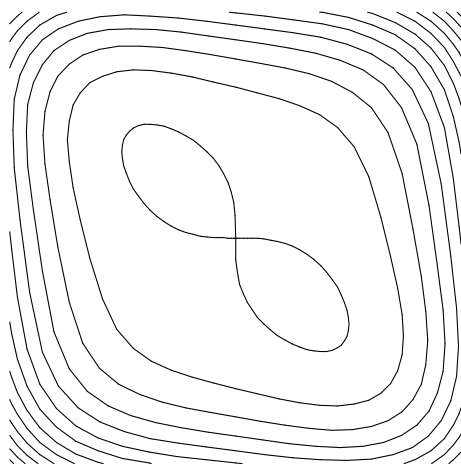
rys. 16



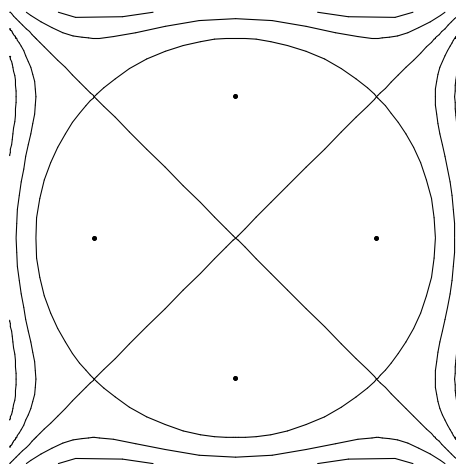
rys. 17



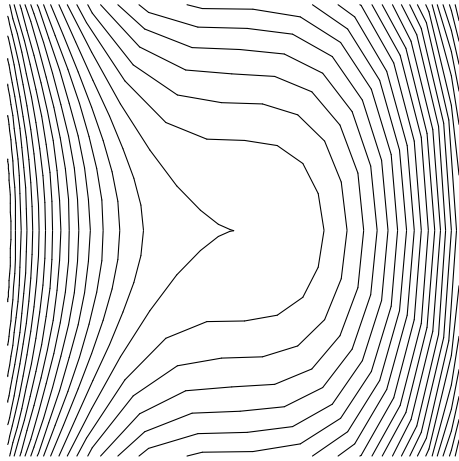
rys. 18



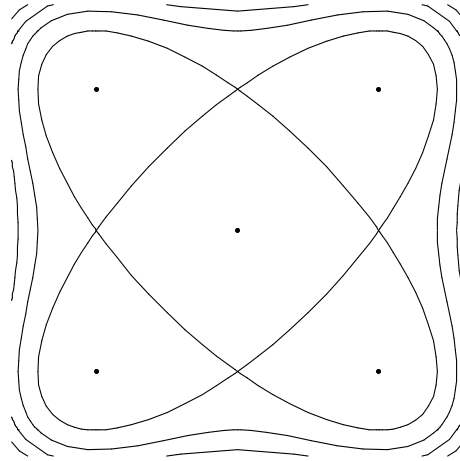
rys. 19



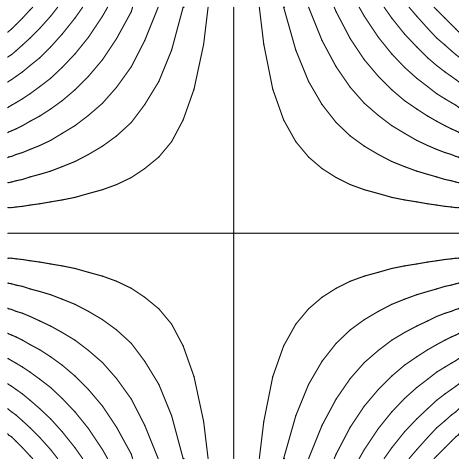
rys. 20



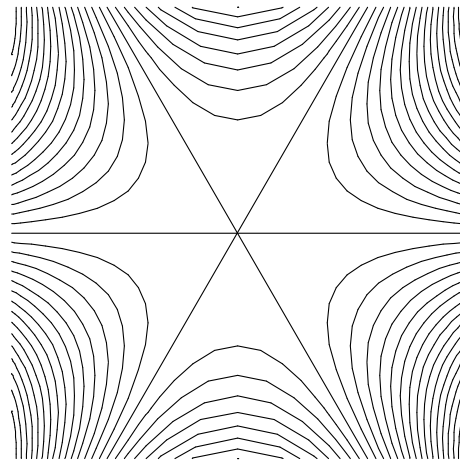
rys. 21



rys. 22



rys. 23



rys. 24