

1.  $f = x^3 - 3xy^2$ . Oblicz:  $f_{xx} + f_{yy}$ .
2.  $f = xy(x^2 - y^2)$ . Oblicz:  $f_{xx} + f_{yy}$ .
3.  $f = \ln(x^2 + y^2)$ . Oblicz:  $f_{xx} + f_{yy}$ .
4.  $f = \operatorname{artg} \frac{x+y}{1-xy}$ . Oblicz:  $f_{xy}$ .
5.  $f = \operatorname{artg} \frac{y}{x}$ . Oblicz:  $xf_x + yf_y$ ,  $xf_y - yf_x$ ,  $f_{xx} + f_{yy}$ .

Znadź ekstrema lokalne funkcji:

$$f = 5x^2 + 2y^2 - 6xy - 2x, \quad f = y^3 + 3x^2y - 3xy, \quad f = x^3 + 3xy^2 - 15x - 12y,$$

$$f = xy(x + y - 3), \quad f = (x + y + 1)^3 - 27xy, \quad f = (x + y)^3 - 3x^2 - 3y^2,$$

$$f = x^3 + y^3 - 3xy, \quad f = x^3 + 3xy^2 - 15x - 12y, \quad f = x^2 + y^2 + \frac{1}{x+y},$$

$$f = x + y + \frac{1}{xy}, \quad f = xy + \frac{1}{x} + \frac{1}{y}, \quad f = 2(x + y)^2 + \frac{1}{x} + \frac{1}{y}.$$