

LIST 3. Extremes of Multivariable Functions.

Task 1: Find all extremes of the two variables functions:

a. $f(x, y) = x^2 + y^2 - 3$;

f. $f(x, y) = x^2 + xy + y^2 - 4\ln x - 10\ln y$,

b. $f(x, y) = x^2 + xy + y^2 - 6x - 9y$;

g. $f(x, y) = x^3 y^2 (6 - x - y)$ ($x > 0$ $y > 0$);

c. $f(x, y) = x^4 + 4xy + y^4 - 2x^2 - 2y^2$;

h. $f(x, y) = e^{2x+3y} (8x^2 - 6xy + 3y^2)$;

d. $f(x, y) = x^2 y - xy^2 + \frac{y^3}{3} - 9y$;

i. $f(x, y) = (x^2 + y) \sqrt{e^y}$;

e. $f(x, y) = 2xy - \frac{4}{x} - \frac{12}{y}$ ($x \neq 0$ $y \neq 0$);

j. $f(x, y) = (2x^2 + y^2) e^{-(x^2 + y^2)}$.

Task 2: Find all extremes of the three variables functions:

a. $f(x, y, z) = x^2 + y^2 + z^2 - xy + x - 2z$; b. $f(x, y, z) = x + \frac{y^2}{4x} + \frac{z^2}{y} + \frac{2}{z}$ ($x > 0$, $y > 0$, $z > 0$).