

ANALIZA MATEMATYCZNA A3. LISTA 5.

- Znajdź ekstrema lokalne zadanych funkcji
 - $f(x, y) = x + y - 4x^2y^2$
 - $f(x, y) = e^{xy} - x$
 - $f(x, y) = x^3 + y^3 + xy$
 - $f(x, y) = x^3 - y^3 + xy$
 - $f(x, y) = x^2 + xy + y^2 + x - y + 1$
 - $f(x, y) = 4(x - y) - x^2 - y^2$
 - $f(x, y) = x^2 + xy + y^2 + a^3/x + a^3/y$
 - $f(x, y) = x^3 + y^2 - 6xy - 39x + 18y$
 - $f(x, y) = 5 - |x| - |y|$
 - $f(x, y) = |5 - |x| - |y||$
 - $f(x, y) = (5 - x^2 - y^2)^2$
 - $f(x, y) = (5 - x^2 - y^2)^3$
 - $f(x, y) = |5 - |x||$
 - $f(x, y) = y^2 + |5 - |x||$
 - $f(x, y) = y^3 + |5 - |x||$
- Znajdź najmniejszą i największą wartość funkcji na danym zbiorze
 - $f(x, y) = x^2 + y^2 - xy + x + y$ na trójkącie o wierzchołkach $(0,0)$, $(-3,0)$, $(0,-3)$
 - $f(x, y) = 2xy$ na kole jednostkowym o środku w $(0,0)$
 - $f(x, y) = 2x^2 - 2y^2$ na kole o środku w $(0,0)$ i promieniu 2
 - $f(x, y) = 2 - \sqrt{4 - x^2 - y^2}$ na kole o środku w $(0,0)$ i promieniu 2
 - $f(x, y) = 2\sqrt{1 - \frac{1}{4}x^2 - \frac{1}{3}y^2}$
- Znajdź najmniejszą i największą wartość funkcji na danym zbiorze
 - $f(x, y) = x^6 + y^6 + xy$, $x, y \in [-1, 1]$
 - $f(x, y) = x^2 + y^2 + 4\arctg(xy)$, $[0, 10]^2$
 - $f(x, y) = \frac{1}{2+xy} + \frac{x}{8}$, $x, y \in [-1, 1]$
 - $f(x, y) = x^4 + y^4$, $x, y \in [0, 10]$, $x + 8y \geq 9$
 - $f(x, y) = (x - 1)^2 + \frac{16}{9}(y - 2)^2$, $x \in [0, 2]$, $0 \leq y \leq x^2$
 - $z = |x| + |y - 2|$, \mathbb{R}^2
 - $f(x, y) = [x + y - 3] + [y - 2]$, $[-5, 5]^2$
 - $f(x, y) = |x| + (x + y)^2 + \frac{3}{2}y$, $[-1, 1]^2$
 - $f(x, y) = |x - 3| + |y - 2|$, $x, y \in [-5, 5]$
 - $f(x, y) = [x + y - 3] + [y - 2]$, $x, y \in [-5, 5]$
- Liczbę dodatnią przedstawić w postaci sumy trzech składników dodatnich tak, by ich iloczyn był największy.
- Wyznacz punkt płaszczyzny $z = 0$, dla którego suma kwadratów odległości od punktów $A_1(1, 2, 1)$, $A_2(1, 3, 4)$, $A_3(-1, 2, 2)$, $A_4(0, 2, 3)$, $A_5(5, 1, 5)$ jest najmniejsza. (Uogólnij.) A jak to jest w kwadracie? A w trójkącie? A w czworokącie?
- Sprawdzić, że najbardziej ekonomiczne wymiary ma prostopadłościenny odkryty z góry zbiornik, gdy dno jest kwadratem, a głębokość jest
- W daną kulę o średnicy $2r$ wpisać prostopadłościan o największej objętości.

8. Okna romańskie (zwieńczenie jest półokręgiem) mają obwód równy d (suma długości trzech odcinków i półokręgu). Wyznacz stosunek wysokości do szerokości takiego okna o największym prześwicie (czyli o największym polu powierzchni).

9. Wyznacz wartość najmniejszą i największą funkcji przy podanych warunkach posługując się metodą czynników nieoznaczonych Lagrange'a. W których przykładach można to zrobić prościej?

- $f(x, y) = 2x^2 + y^2 + 2y - 3$
- $f(x, y) = x^3 + x^2 + y^2/3$
- $f(x, y) = xy$
- $f(x, y) = 16 - x^2 - 4y^2$
- $f(x, y) = 4x^2 + y^3 + 3y + 7$
- $f(x, y) = x^2 + y^2 = 4$
- $f(x, y) = \cos^2 x + \cos^2 y$
- $f(x, y) = 2x^2 + y^2 \leq 4$
- $f(x, y) = \cos^2 x + \cos^2 y$ gdy $x - y = \pi/4$
- $f(x, y) = xy$ gdy $x^4 + 2y^4 \leq 1$
- $f(x, y) = xy$ gdy $x^2 + y^2 = 32$
- $f(x, y) = xy$ gdy $x^2 + y^2 = 4$
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- $f(x, y) = xy$ gdy $x^2 + y^2 = 32$
- $f(x, y) = xy$ gdy $x^2 + y^2 = 4$
- $f(x, y) = xy$ gdy $x^2 + y^2 \leq 36$
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