

Key Problems

Problem 1.

Solve the Kuhn-Tucker problems:

a) $\max f(x,y,z) = x - 2y + z$ when $x^2 + y^2 + z^2 \leq 3$

b) $\max f(x,y,z,w) = xz + yw$ when $x^2 + y^2 \leq 1$ and $4z^2 + 9w^2 \leq 36$

Problem 2.

Solve the Kuhn-Tucker problems:

a) $\max f(x,y,z) = x^2y^2z^2$ when $x^2 + y^2 + z^2 + x^2y^2z^2 \leq 4$

b) $\max f(x,y) = \ln(x^2y) - x - y$ when $x \geq 1$, $y \geq 1$ and $x + y \geq 4$

Problem 3.

Determine the range of the following quadratic functions:

a) $f(x,y,z) = x^2 + 4xz + y^2 + 5z^2 - 4y + 2z$

b) $f(x,y,z,w) = 3x^2 + 2xy + 8xz - 2xw + y^2 + 4yz + 2yw + 6z^2 + 3w^2 + 1$

Exercise Problems

Problems from the textbook: [E] 6.3cd, 6.5 - 6.7, 6.10

Exam problems: [Final 11/2017] Question 3 - 4

[Final 11/2018] Question 4

Answers to Key Problems

Problem 1.

a) $f_{\max} = 3\sqrt{2}$

b) $f_{\max} = 3$

Problem 2.

a) $f_{\max} = 1$

b) $f_{\max} = 8 \ln 2 - 3 \ln 3 - 4$

Problem 3.

a) $[-5, \infty)$

b) $[1, \infty)$