Week 6 Assignment 6

The due date for submitting this assignment has passed. Due on 2018-09-19, 23:59 IST.

As per our records you have not submitted this assignment.

1)

A Constrained NLP with inequality constraints can be solved with the help of:

1. Lagrange Multipliers
2. Karush-Kuhn-Tucker Conditions (KKT Conditions)
3. Both Lagrange Multipliers and KKT Conditions
4. None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.

2)

While solving a Constrained NLP with equality constraints, Number of Lagrange multipliers will be dependent on:

1. Number of decision variables
2. Number of equality constraints
3. Degree of nonlinearity
4. None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.
Linear constraints can be considered as:

i. Convex function only
ii. Concave function only
iii. Both convex and concave
iv. None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
iii.

Objective function can have a global maximum, if the objective function is a:

i. Convex function
ii. Concave function
iii. Linear function
iv. None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
ii.

An NLP can be termed as a convex program, if:

i. Objective function and constraints are concave
ii. Objective function and constraints are convex
iii. Objective function is convex but constraints are concave
iv. Objective function is concave but constraints are convex

No, the answer is incorrect.
Score: 0
Accepted Answers:
iv.
Consider the NLP with equality constraint: Max \( f(x) = 2x_1+3x_2 \) s.t. \( g(x) = x_1^2+x_2^2 = 6 \)
At the optimum point, we can observe this about Gradient of \( f(x) \) and Gradient of \( g(x) \):

i. Gradient of \( f(x) \) is parallel to Gradient of \( g(x) \)
ii. Gradient of \( f(x) \) is perpendicular to Gradient of \( g(x) \)
iii. Gradient of \( f(x) \) is neither perpendicular nor parallel to Gradient of \( g(x) \)
iv. Nothing can be concluded about the gradients

No, the answer is incorrect.
Score: 0
Accepted Answers:

Consider the NLP with equality constraint: Max \( f(x) = 2x_1+3x_2 \) s.t. \( g(x) = x_1^2+x_2^2 = 6 \)
If ‘\( a \)’ is the Lagrange Multiplier, then the Lagrange Function for the problem will be:

i. \( L(x, a) = 2x_1+3x_2 - a(x_1^2+x_2^2 - 6) \)
ii. \( L(x, a) = x_1^2+x_2^2 - a(2x_1+3x_2) \)
iii. \( L(x, a) = 2x_1+3x_2 - a(x_1^2+x_2^2) - 6 \)
iv. None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:

Consider the NLP with equality constraint: Max \( f(x) = 2x_1+3x_2 \) s.t. \( g(x) = x_1^2+x_2^2 = 6 \)
‘\( a \)’ is the Lagrange Multiplier. \( L(x, a) \) is the Lagrange Function. Necessary Conditions for optimality will be obtained by:

i. Differentiating \( L(x, a) \) with respect to \( x_1 \) only
ii. Differentiating \( L(x, a) \) with respect to \( x_1 \) as well as with respect to \( x_2 \)
iii. Differentiating \( L(x, a) \) with respect to \( x_1, x_2 \), and also with respect to ‘\( a \)’
iv. None of the above

No, the answer is incorrect.
9) While solving the Constrained NLP: \( \text{Max } f(r, h) = -6.28r^2 - 6.28r h \) \ s.t. \( 3.14r^2h = 100 \)
Where \( r \) is the radius of a right circular cylinder and \( h \) is the height.
If \( \lambda \) is a Lagrange Multiplier, then the Lagrange Function will be:

i. \( L(r, h, \lambda) = -6.28r^2 - 6.28rh - \lambda(2\ln r + \ln h + \ln 3.14) \)
ii. \( L(r, h, \lambda) = -6.28r^2 - 6.28rh - \lambda(2\ln r + \ln h + \ln 3.14 - \ln 100) \)
iii. \( L(r, h, \lambda) = -6.28r^2 - 6.28rh - \lambda(2\ln r + \ln h) \)
iv. None of the above

No, the answer is incorrect.

10) Consider Question 9 again. After solving, the condition of optimality will be:

i. \( r = 2h \)
ii. \( r = h \)
iii. \( r = h/2 \)
iv. \( r = h/3 \)

No, the answer is incorrect.

11) Consider a Constrained NLP Problem as follows:
\( \text{Max } f(x_1, x_2) = 20x_1 - 2x_1^2 + 25x_2 - 5x_2^2 \) \ s.t. \( x_1 + x_2 = 10; \text{ } \text{and } x_1 \geq 0, x_2 \geq 0 \)
Assuming \( \lambda \) as a multiplier, which of the following is not a valid KKT Condition?

i. \( x_1(20 - 4x_1 - \lambda) = 0 \)
ii. \( x_2(25 - 10x_2 - \lambda) = 0 \)
iii. \( \lambda(x_1 + x_2 - 10) = 0 \)
iv. \( \lambda(x_1 + x_2) = 0 \)
Consider Question 11 again. It is additionally given that \( x_1 > 0 \) and \( x_2 > 0 \). Which of the following relation will then not be directly implied from the KKT Conditions?

i. \( x_1 + x_2 = 10 \)

ii. \( u = 20 - 4x_1 \)

iii. \( u = 25 - 10x_2 \)

iv. \( x_1 + x_2 \leq 10 \)

No, the answer is incorrect.
Score: 0
Accepted Answers: iv.

Consider a Constrained NLP Problem with equality constraint as follows:
Max \( f(x_1, x_2) = 20x_1 - 2x_1^2 + 25x_2 - 5x_2^2 \) s.t. \( x_1 + x_2 = 10 \) and \( x_1 \geq 0, x_2 \geq 0 \)
Can this problem be solved with KKT Conditions?

i. Yes, it can be solved by KKT Conditions, but by taking \( x_1 + x_2 \leq 10 \)

ii. Yes, it can be solved by KKT Conditions, but by taking \( x_1 + x_2 \geq 10 \)

iii. No, it cannot be solved by KKT Conditions

iv. Yes, it can be solved by KKT Conditions

No, the answer is incorrect.
Score: 0
Accepted Answers: iv.
Constraints in a Quadratic problem are:

i. Linear functions
ii. Quadratic functions
iii. Polynomial functions
iv. None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
i.

While using Modified Simplex method for Quadrating Programming Problems, we have

i. All constraints are linear
ii. Some of the constraints are linear
iii. All constraints are nonlinear except the complimentary condition
iv. All constraints are linear except the complimentary condition

No, the answer is incorrect.
Score: 0
Accepted Answers:
iv.