Week 5 : Assignment 5

The due date for submitting this assignment has passed.

Due on 2024-08-28, 23:59 IST.

Assignment submitted on 2024-08-28, 19:37 IST

1) The values of μ_1, μ_2 and μ_3 while evaluating the Karush-Kuhn-Tucker (KKT) condition with all the constraints being inactive are *1 point*

- $\mu_1 = \mu_2 = \mu_3 = 1$
- $\mu_1 = \mu_2 = \mu_3 = 0$
- $\mu_1 = \mu_3 = 0, \mu_2 = 1$
- $\mu_1 = \mu_2 = 0, \mu_3 = 1$

Yes, the answer is correct.
Score: 1
Accepted Answers:
$\mu_1 = \mu_2 = \mu_3 = 0$

2) Gradient based algorithm methods compute *1 point*

- only step length at each iteration
- both direction and step length at each iteration
- only direction at each iteration
- none of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
both direction and step length at each iteration

3) The point on the plane $x + y - 2z = 6$ that is closest to the origin is *1 point*

- (0, 0, 0)
- (1, 1, 1)
- (−1, 1, 2)
- (1, 1, −2)

Yes, the answer is correct.
Score: 1

Accepted Answers:
(1, 1, −2)

4) Find the maximum value of $f(x, y) = 49 - x^2 - y^2$ subject to the constraints $x + 3y = 10$. ***1 point***

- 49
- 46
- 59
- 39

Yes, the answer is correct.
Score: 1

Accepted Answers:
39

5) The minimum value of $f(x, y) = x^2 + 4y^2 - 2x + 8y$ subject to the constraint $x + 2y = 7$ occurs at the below point: ***1 point***

- (5, 5)
- (−5, 5)
- (1, 5)
- (5, 1)

Yes, the answer is correct.
Score: 1

Accepted Answers:
(5, 1)

6) Which of the following statements is/are **NOT TRUE** with respect to the multi variate optimization? ***1 point***

I - The gradient of a function at a point is parallel to the contours
II - Gradient points in the direction of greatest increase of the function
III - Negative gradients points in the direction of the greatest decrease of the function
IV - Hessian is a non-symmetric matrix

- I
- II and III
- I and IV
- III and IV

Yes, the answer is correct.
Score: 1

Accepted Answers:
I and IV

7) The solution to an unconstrained optimization problem is always the same as the solution to the constrained one. ***1 point***

- True
- False

Yes, the answer is correct.
Score: 1

Accepted Answers:
False

8) A manufacturer incurs a monthly fixed cost of $7350 and a variable cost, $C(m) = 0.001m^3 - 2m^2 + 324m$ dollars. The revenue generated by selling these units is, $R(m) = -6m^2 + 1065m$. How many units produced every month (m) will generate maximum profit? ***1 point***

- $m = 46$
- $m = 90$
- $m = 231$
- $m = 125$

Yes, the answer is correct.
Score: 1

Accepted Answers:
$m = 90$

9) Consider an optimization problem $\min_{x_1,x_2} x^2 - xy + y^2$ subject to the constraints ***1 point***

$2x + y \leq 1$
$x + 2y \geq 2$
$x \geq -1$

Find the lagrangian function for the above optimization problem.

- $L(x, y, \mu_1, \mu_2, \mu_3) = x^2 - xy + y^2 + \mu_1(2x + y - 1) + \mu_2(2 - x - 2y) + \mu_3(-x - 1)$
- $L(x, y, \mu_1, \mu_2, \mu_3) = x^2 - xy + y^2 + \mu_1(2x + y - 1) + \mu_2(x + 2y - 2) + \mu_3(-x - 1)$
- $L(x, y, \mu_1, \mu_2, \mu_3) = x^2 - xy + y^2 + \mu_1(2x + y - 1) + \mu_2(x + 2y - 2) + \mu_3(x + 1)$
- $L(x, y, \mu_1, \mu_2, \mu_3) = x^2 - xy + y^2 + \mu_1(1 - 2x - y) + \mu_2(2 - x - 2y) + \mu_3(-x - 1)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$L(x, y, \mu_1, \mu_2, \mu_3) = x^2 - xy + y^2 + \mu_1(2x + y - 1) + \mu_2(2 - x - 2y) + \mu_3(-x - 1)$