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 NPTEL (<https://swayam.gov.in/explorer?ncCode=NPTEL>) » Data Science for Engineers (course)


## Course outline

About NPTEL ()

How does an NPTEL online course work? ()

Setup Guide ()

Pre Course Material ()

Week 0 ()

Week 1 ()

Week 2 ()

Week 3 ()

Week 4 ()

Week 5 ()

☐ Multivariate Optimization With Equality

# 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  $\mu_1$ ,  $\mu_2$  and  $\mu_3$  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**

Constraints  
(unit?  
unit=63&lesso  
n=64)

☐ Multivariate  
Optimization  
With Inequality  
Constraints  
(unit?  
unit=63&lesso  
n=65)

☐ Introduction to  
Data Science  
(unit?  
unit=63&lesso  
n=66)

☐ Solving Data  
Analysis  
Problems - A  
Guided  
Thought  
Process (unit?  
unit=63&lesso  
n=67)

☐ Dataset (unit?  
unit=63&lesso  
n=68)

☐ FAQ (unit?  
unit=63&lesso  
n=69)

☐ Practice:  
Week 5:  
Assignment 5  
(Non Graded)  
(assessment?  
name=210)

☐ Week 5  
Feedback  
Form : Data  
Science for  
Engineers  
(unit?  
unit=63&lesso  
n=157)

☒ Quiz: Week 5  
: Assignment  
5  
(assessment?  
name=221)

Week 6 ()

- ☐ (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 **1 point**  
 $x + 3y = 10$ .

- ☐ 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 **1 point**  
 $x + 2y = 7$  occurs at the below 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 **1 point**  
optimization?

- 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

Week 7 ()

Week 8 ()

Text  
Transcripts  
()

Download  
Videos ()

Books ()

Problem  
Solving  
Session -  
July 2024 ()

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, **1 point**  
 $C(m) = 0.001m^3 - 2m^2 + 324m$  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?

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

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 **1 point**  
constraints

$$2x + y \leq 1$$

$$x + 2y \geq 2$$

$$x \geq -1$$

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:

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