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reviewer4@nptel.iitm.ac.in ✓

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

 Announcements (announcements) **About the Course** (https://swayam.gov.in/nd1_noc20_cs28/preview)

Ask a Question (forum) Progress (student/home) Mentor (student/mentor)

Unit 6 - Week 4

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

- ☐ Optimization for Data Science (unit? unit=30&lesson=31)
- ☐ Unconstrained Multivariate Optimization (unit? unit=30&lesson=32)
- ☐ Unconstrained Multivariate Optimization (Continued) (unit? unit=30&lesson=33)

Assignment 4

The due date for submitting this assignment has passed. **Due on 2020-02-26, 23:59 IST.**
As per our records you have not submitted this assignment.

1) Consider $f(x)$, if x is the decision variable and f is a function to be minimized, then the type **1 point** of optimization problem is

- ☐ Constrained optimization
- ☐ Unconstrained optimization
- ☐ Discrete optimization
- ☐ None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Unconstrained optimization

2) Match the following

1 point

I. $\min_{\bar{x}} f(\bar{x})$	a. Equality constraints
II. $s.t h(\bar{x}) = 0$	b. Objective function
III. $g(\bar{x}) > 0$	c. Inequality constraints

- ☐ I - a, II - b , III - c

☒ Gradient (Steepest) Descent (OR) Learning Rule (unit? unit=30&lesson=34)

☐ FAQ (unit? unit=30&lesson=35)

☐ Quiz : Practice Assignment 4 (assessment? name=93)

☐ Quiz : **Assignment 4** (assessment? name=113)

☐ Week 4 Feedback (unit? unit=30&lesson=117)

☒ Solution - Assignment 4 (unit? unit=30&lesson=122)

Week 5

Week 6

Week 7

Week 8

Text Transcripts

Download Videos

- ☐ I - b , II - a , III - c
☐ I - a , II - c , III - b
☐ I - c , II - a , III - b

No, the answer is incorrect.
Score: 0

Accepted Answers:
I - b , II - a , III - c

3) In univariate unconstrained optimization the decision variables can be

1 point

- ☐ Continuous
☐ Integral
☐ Continuous or Integral
☐ Not defined

No, the answer is incorrect.
Score: 0

Accepted Answers:
Continuous or Integral

4) State whether the following statements are true or false with respect to Linear programming problem **1 point**

- I. Decision variables are continuous
 II. Objective function is linear
 III. Constraints are nonlinear

- ☐ I - True , II - True , III - False
☐ I - True , II - True , III - True
☐ I - False , II - False , III - False
☐ I - False , II - True , III - True

No, the answer is incorrect.
Score: 0

Accepted Answers:
I - True , II - True , III - False

5) If $f(\bar{x})$ is **QUADRATIC** function of \bar{x} and $g(\bar{x})$, $h(\bar{x})$ are **LINEAR** functions of \bar{x} , then the type of optimization problem is **1 point**

- ☐ dual linear programming
☐ linear programming
☐ quadratic programming
☐ none of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
quadratic programming

6) The maximization of a function $f(\bar{x})$ is equal to the minimization of the function **1 point**

- ☐
 $-f(\bar{x})$
☐
 $f'(\bar{x})$
☐
 $f''(\bar{x})$



$$-f''(\bar{x})$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$-f(\bar{x})$$

7) For an unconstrained optimization problem given below,

1 point

$$\min_x f(x)$$

for x^* , to be the minimizer of $f(x)$, the second order necessary condition is



$$f'(x) > 0$$



$$f''(x) < 0$$



$$f''(x) > 0$$



$$f'(x) = 1$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$f''(x) > 0$$

8) If $f(x) = 3x^4 + 2x^3 + 3x^2 + 3$, then the first order necessary condition for either maxima **1 point** or minima of $f(x)$ is



$$12x^3 + 6x^2 + 3x = 0$$



$$12x^3 + 6x^2 + 6x = 0$$



$$3x^4 + 2x^3 + 3x^2 = 0$$



$$8x^3 - 18x^2 - 24x = 0$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$12x^3 + 6x^2 + 6x = 0$$

9) For a function $f(x) = x^3 - 12x^2 + 48x - 64 = 0$, which of the following numbers is a **1 point** stationary point of $f(x)$



2



4



1



-1

No, the answer is incorrect.

Score: 0

Accepted Answers:

4

10) If a function is strictly increasing what is the minima value?

1 point

- ☐ 0
- ☐ -1
- ☐ $-\infty$
- ☐ 1

No, the answer is incorrect.

Score: 0

Accepted Answers:

$-\infty$

11) If the derivative of the objective function is a polynomial of order 'N' and has roots which are repeated thrice, then how many stationary points exist for the objective function? 1 point

- ☐ N-1
- ☐ N-3
- ☐ N-2
- ☐ N

No, the answer is incorrect.

Score: 0

Accepted Answers:

N-2

12) For any two points x_1 and x_2 in $[a, b]$ and any λ where $0 < \lambda < 1$ the convex function is given by 1 point

- ☐ $f[\lambda x_1 + (1 - \lambda)x_2] \leq \lambda f(x_1) + (1 - \lambda)f(x_2)$
- ☐ $f[\lambda x_1 + (1 - \lambda)x_2] \geq \lambda f(x_1) + (1 - \lambda)f(x_2)$
- ☐ $f[\lambda x_1 + (\lambda)x_2] \geq \lambda f(x_1) + (1 - \lambda)f(x_2)$
- ☐ $f[\lambda x_1 + (1 - \lambda)x_2] \leq \lambda f(x_1) + (1 + \lambda)f(x_2)$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$f[\lambda x_1 + (1 - \lambda)x_2] \leq \lambda f(x_1) + (1 - \lambda)f(x_2)$

13) Consider a univariate optimization function $f(x)$. If the function satisfies the first order condition and gives an output of the minimum value -5 and the second-order condition gives an output of the minimum value -7. In this which of the following value would be considered as a global minimum of $f(x)$ 1 point

- ☐ -5
- ☐ -7
- ☐ -12
- ☐ 2

No, the answer is incorrect.

Score: 0

Accepted Answers:

-7

14)

1 point

Which of the following statements are true in the univariate optimization?

- I. The function f has only one decision variable
- II. x is a vector variable

- ☐ Only I is true
- ☐ Only II is true
- ☐ Both I and II is true
- ☐ None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Only I is true

15 For a function $f(x) = x^4 - 3x^3 + x^2 + 23$, stationary points which are qualified to be minimizers of $f(x)$ are **1 point**

- ☐ 0,2
- ☐ 0,-2.5
- ☐ 0.25,2
- ☐ 2,-2.5

No, the answer is incorrect.

Score: 0

Accepted Answers:

0,2