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Course outline

How does an NPTEL online course work? ()

Setup Guide ()

Pre Course Material ()

Week 4: Assignment 4

The due date for submitting this assignment has passed.

Due on 2023-08-23, 23:59 IST.

As per our records you have not submitted this assignment.

1) Let $f(x) = x^3 + 3x^2 - 24x + 7$. Select the correct options from the following: ***3 points***

- $x = 2$ will give the maximum for $f(x)$.
- $x = 2$ will give the minimum for $f(x)$.
- Maximum value of $f(x)$ is 87.
- The stationary points for $f(x)$ are 2 and 4.

Week 0 ()

Week 1 ()

Week 2 ()

Week 3 ()

Week 4 ()

- Optimization for Data Science (unit?unit=55&lesson=56)
- Unconstrained Multivariate Optimization (unit?unit=55&lesson=57)
- Unconstrained Multivariate Optimization (Continued) (unit?unit=55&lesson=58)
- Gradient (Steepest) Descent (OR) Learning Rule (unit?unit=55&lesson=59)
- FAQ (unit?unit=55&lesson=60)
- Practice: Week 4: Assignment 4 (Non Graded) (assessment?name=144)

No, the answer is incorrect.
Score: 0

Accepted Answers:
$x = 2$ *will give the minimum for* $f(x)$.
Maximum value of $f(x)$ *is 87.*

2) Find the gradient of $f(x, y) = x^2y$ at $(x, y) = (1, 3)$. ***2 points***

- $\nabla f = \begin{bmatrix} 1 \\ 6 \end{bmatrix}$
- $\nabla f = \begin{bmatrix} 6 \\ 1 \end{bmatrix}$
- $\nabla f = \begin{bmatrix} 6 \\ 9 \end{bmatrix}$
- $\nabla f = \begin{bmatrix} 3 \\ 3 \end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\nabla f = \begin{bmatrix} 6 \\ 1 \end{bmatrix}$

3) Find the Hessian matrix for $f(x, y) = x^2y$ at $(x, y) = (1, 3)$. ***2 points***

- $\nabla^2 f = \begin{bmatrix} 3 & 2 \\ 2 & 0 \end{bmatrix}$
- $\nabla^2 f = \begin{bmatrix} 3 & 3 \\ 3 & 0 \end{bmatrix}$

- **Quiz: Week 4: Assignment 4 (assessment?name=170)**
- Week 4 Feedback Form : Data Science For Engineers (unit?unit=55&lesson=156)
- Week 4: Solution (unit?unit=55&lesson=172)
- **Week 5 ()**
- **Week 6 ()**
- **Week 7 ()**
- **Week 8 ()**
- **Text Transcripts ()**
- **Download Videos ()**
- **Books ()**
- **Problem Solving Session - July 2023 ()**

$\nabla^2 f = \begin{bmatrix} 6 & 2 \\ 2 & 0 \end{bmatrix}$

$\nabla^2 f = \begin{bmatrix} 6 & 3 \\ 3 & 0 \end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$\nabla^2 f = \begin{bmatrix} 6 & 2 \\ 2 & 0 \end{bmatrix}$

4) Let $f(x, y) = -3x^2 - 6xy - 6y^2$. The point $(0, 0)$ is a **1 point**

- saddle point
- maxima
- minima

No, the answer is incorrect.
Score: 0

Accepted Answers:

maxima

5) For which numbers b is the matrix $A = \begin{bmatrix} 1 & b \\ b & 9 \end{bmatrix}$ positive definite? **1 point**

$-3 < b < 3$

$b = 3$

$b = -3$

$-3 \leq b \leq 3$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$-3 < b < 3$

6) Consider $f(x) = x^3 - 12x - 5$. Which among the following statements are true? ***1 point***

- [ ] $f(x)$ is increasing in the interval $(-2, 2)$.
- [ ] $f(x)$ is increasing in the interval $(2, \infty)$.
- [ ] $f(x)$ is decreasing in the interval $(-\infty, -2)$.
- [ ] $f(x)$ is decreasing in the interval $(-2, 2)$.

No, the answer is incorrect.
Score: 0

Accepted Answers:
$f(x)$ is increasing in the interval $(2, \infty)$.
$f(x)$ is decreasing in the interval $(-2, 2)$.

7) Consider the following optimization problem: ***1 point***

$$\max_{x \in \mathbb{R}} f(x)$$

, where

$$f(x) = x^4 + 7x^3 + 5x^2 - 17x + 3$$

Let x^* be the maximizer of $f(x)$. What is the second order sufficient condition for x^* to be the maximizer of the function $f(x)$?

- $4x^3 + 21x^2 + 10x - 17 = 0$
- $12x^2 + 42x + 10 = 0$
- $12x^2 + 42x + 10 > 0$
- $12x^2 + 42x + 10 < 0$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$12x^2 + 42x + 10 < 0$

8) In optimization problem, the function that we want to optimize is called **1 point**

- Decision function
- Constraints function
- Optimal function
- Objective function

No, the answer is incorrect.
Score: 0

Accepted Answers:

Objective function

9) The optimization problem $\min_x f(x)$ can also be written as $\max_x f(x)$. **1 point**

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:

False

10) Gradient descent algorithm converges to the local minimum. **1 point**

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:

True