

MT 2008: Multi-Variable Calculus

Section: A,B (Fall 2021)

A-02

[Marks: 60]

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Lectures:**Launch:**

Tue, Oct 12 ,21

Submit Date:
Mon,oct 18, 21

CLO-02: **Compute** limit, continuity and derivatives of function of several variables to solve optimization problems

Submit on GCR by Submit Date – Late Assignments not accepted

Submitted by:	Roll #:	Section:
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Assignment Submission: Terms & Conditions

1. This is a graded assignment; students are advised to revise all concepts before attempting.
2. Submit a **single PDF** in **GCR** by the submit date mentioned in GCR; SLATE/email not accepted.
3. Any pics or images used in the PDF must be scanned with **ClearScanner** app.
4. **Do not use** CamScanner or MS Lens as it deteriorates the image quality and the writing at the back of the page is also visible.
5. Submitting individual pictures or attaching multiple files **not accepted**.
6. **Late submission not accepted**.
7. Be sure to fill and checkmark the agreement in the submission box. **If not filled or checked, submission not accepted**.

Assignment Collaboration: Terms & Conditions

1. Collaboration is permitted with limitations as defined below.
2. All collaboration to be strictly done on GCR -> Assignment Collaboration Channel. May not post/discuss on any other forum.
3. Permitted forms of collaboration include (but not limited to) asking questions, answering questions, explaining intent of the question, explaining concepts, highlighting methods, discussion of all types, etc.
4. Forbidden forms of collaboration include (but not limited to) uploading solutions or partial solutions, letting know the partial or final answers, etc.

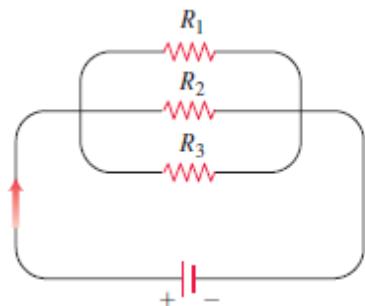
This Channel will be monitored continuously. Anyone indulging in forbidden activities will be removed from the channel, their posts deleted, and zero marks assigned in the assignment.

Assignment Problem:

Question 1: If resistors of R_1 , R_2 , and R_3 ohms are connected in parallel to make an R -ohm resistor, the value of R can be found from the equation

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

- . Find the value of $\partial R / \partial R_2$ when $R_1 = 30$, $R_2 = 45$, and $R_3 = 90$ ohms.



Question 2:

At what points (x, y, z) in space are the functions a. $h(x, y, z) = \frac{1}{|y| + |z|}$ b. $h(x, y, z) = \frac{1}{|xy| + |z|}$ continuous?

Question 3:

By considering different paths of approach, show that the functions have no limit as $(x, y) \rightarrow (0, 0)$.

$$h(x, y) = \frac{x^2 y}{x^4 + y^2}$$

Question 4:

A delivery company accepts only rectangular boxes the sum of whose length and girth (perimeter of a cross-section) does not exceed 108 in. Find the dimensions of an acceptable box of largest volume.

Question 5:

. Let $f(x, y) = \frac{(x - y)}{(x + y)}$. Find the directions \mathbf{u} and the values of $D_{\mathbf{u}} f\left(-\frac{1}{2}, \frac{3}{2}\right)$ for which

$$D_{\mathbf{u}} f\left(-\frac{1}{2}, \frac{3}{2}\right) = 0$$

Question 6:

Changing voltage in a circuit The voltage V in a circuit that satisfies the law $V = IR$ is slowly dropping as the battery wears out. At the same time, the resistance R is increasing as the resistor heats up. Use the equation

$$\frac{dV}{dt} = \frac{\partial V}{\partial I} \frac{dI}{dt} + \frac{\partial V}{\partial R} \frac{dR}{dt}$$

to find how the current is changing at the instant when $R = 600$ ohms, $I = 0.04$ amp, $dR/dt = 0.5$ ohm/sec, and $dV/dt = -0.01$ volt/sec.

