National University of Computer & Emerging Sciences **MT 2008: Multi-Variable Calculus** **Section: A,B (Fall 2021)**			**A-03** [Marks: 100]
Instructor: Dr. Farah Jabeen Awan **TA:** Huda Shoaib (i190828@nu.edu.pk)	**Lectures:** 9-14	**Launch:** 26-10-21	**Submit Date:** Soft copy: 28-10-21 Hard copy: 29-10-21

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:**
Check here: ☐ I agree that there is ZERO Tolerance Policy for plagiarism and cheating in all assessments. First plagiarism case gets zero. Subsequent plagiarism cases get ZERO in all assignments. A gross violation may be reported to the Department Discipline Committee (DDC).		

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:

Find the points on the sphere $x^2 + y^2 + z^2 = 4$ that are closest to and farthest from the point (3,1,-1)

Question 2:

Find the points on the hyperbolic cylinder $x^2 - z^2 - 1 = 0$ that are closest to the origin.

Question 3:

Find the maximum value of the function f(x,y,z)=x+2y+3z on the curve of intersection of the plane x-y+z=1 & the cylinder $x^2 + y^2 = 1$

Question 4:

Evaluate $\iint_R ysin(xy)dA$ where R=[1,2]x[o,π]

Question 5:

Evaluate

- $\int_0^{lm3} \int_0^{ln2} e^{x+y} dydyx$
- $\int_0^1 \int_0^1 \frac{x}{(xy+1)^2} dydx$

Question 6:

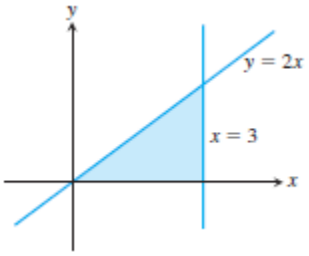
Find the volume of the solid S that is bounded by the elliptic paraboloid $x^2 + y^2 + z = 16$, the planes $x = 2$ and $y = 2$, and the three coordinate planes.

Question 7:

Evaluate $\iint_D (x + 2y)dA\ dA$, where D is the region bounded by the parabolas $y = 2x^2$ and $y = 1 + x^2$

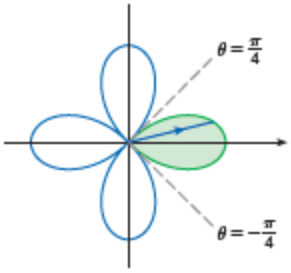
Question 8:

Integrate for $\iint_R dA\, dA$ over the described region R using (a) vertical cross-sections, (b) horizontal cross-sections.



Question 9:

Use a double integral to find the area enclosed by one loop of the four-leaved rose $r = \cos\theta$



Question 10:

Change the Cartesian integral into an equivalent polar integral

$$\int_{-1}^{1}\int_{0}^{(1-x^2)^{\frac{1}{2}}} dydx$$