AHMEDABAD UNIVERSITY
School of Engineering and Applied Science
2025-2026 Monsoon

MAT283 Calculus
Make up End-Semester Examination
Wednesday 31 December 2025. 15:00 – 16:00

Name:	Roll no.	A U 2	Marks /40

Write your answers on this sheet on the provided space only. Answer all questions.

This is a close book exam.

Q1: Evaluate the following statement. State if it is true or false. Justify your answer.

If $v = sin^3(3u^3)$,
then $\frac{dv}{du} = 81u^2 sin^2(3u^3)\cos(3u^3)$

05 Marks

Answer:

Solve the derivative and check if it is true:

Q2: Solve the following

Find the maximum and minimum values of the function $f(u,v) = e^{-uv}$, on the region described by $u^2 + 4v^2 \leq 1$

14 Marks

ANS:

Check for interior points on the region:

Q3

The force due to some unknown source over a region is estimated by the following equation:

$$F(x, y, z) = 5x^2 - 3xy + xyz$$

(a) Find the rate of change of the force at point (3, 4, 5) in the direction of the vector $(i + j + k)$.
(b) In which direction does the force change most rapidly at the point (3, 4, 5)?
(c) What is the maximum rate of change at the point (3, 4 , 5)?

12 Marks

Q4:

Find the curl of the following vector field, F. 09 Marks.

$F = x^2y\,\hat{\imath} + 2xyz\,\hat{\jmath} + xy^2\,\hat{k}$

Answer:

Formula of finding curl

Find the required curl: