

CALCULUS (Global Governance) A.Y. 2025/26

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SECOND MIDTERM EXAM: 12th JANUARY 2026

Last Name:	First Name:	Student's ID:
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Instructions:

- You have 1 hour and 30 minutes to answer the following questions. Report your answers in the table provided below.
- No notes, books, or any other reference materials is allowed during the test.
- Electronic devices, including computers, tablets, and cell phones, are strictly prohibited. You are only permitted to use a non-scientific and non-graphing calculator.

Answers

1	2	3	4	5	6	7

Questions

1. Find the antiderivates of

$$f(x) = 16x^3 e^{4x^4} + \sin(4x)$$

- (a) $4x^4 e^{4x^5} + \sin(4x) + C$
- (b) $e^{4x^4} + \frac{1}{4} \cos(4x) + C$
- (c) $4x^4 e^{4x^4} - 4 \cos(4x) + C$
- (d) $4e^{4x^4} - \sin(4x) + C$
- (e) $e^{4x^4} - \frac{1}{4} \cos(4x) + C$

3. Determine which of the following points belongs to the level curve $\{f(x, y) = C\}$, where

$$f(x, y) = xy - y^2 + 9 \quad \text{and} \quad C = 15.$$

- (a) $(5, 3)$
- (b) $(-1, 4)$
- (c) $(-1, 2)$
- (d) $(4, -4)$
- (e) $(3, -2)$

2. Find the partial derivative f_y of the given function:

$$f(x, y) = y \sin(x^4 y^2)$$

- (a) $4x^3 y^2 \cos(x^4 y^2)$
- (b) $2x^4 y^2$
- (c) $\sin(x^4 y^2)$
- (d) $y \cos(2x^4 y)$
- (e) $\sin(x^4 y^2) + 2x^4 y^2 \cos(x^4 y^2)$

4. Find the critical point of the function

$$f(x, y) = 2x^2 + y^2 + 2xy + 4x + 2y + 4$$

specifying wheter it is a relative minimum, maximum or saddle point:

- (a) $(1, -1)$, saddle point
- (b) $(1, -1)$, local maximum
- (c) $(-1, 0)$, local minimum
- (d) $(-1, 0)$, local maximum
- (e) $(0, -1)$, local minimum

5. Compute

$$\int_0^7 \frac{x^2 + 7x - 3}{x + 7} dx$$

- (a) $\frac{7}{2} - \frac{3}{7} \ln 7$
- (b) $\frac{49}{2} + 3 \ln 14$
- (c) $\frac{49}{2} - 3 \ln 2$
- (d) $49 - 3 \ln 6$
- (e) $49 + 3 \ln 2$

6. Find the second order partial derivative f_{xy} of the given function:

$$f(x, y) = \ln(x^5 + y^3)$$

- (a) $\frac{-5x^8 - 20x^3y^3}{(x^5 + y^3)^2}$
- (b) $-5 \frac{x^4}{(x^5 + y^3)^2}$
- (c) $-3 \frac{y^2}{(x^5 + y^3)^2}$
- (d) $\ln(5x^5)$
- (e) $-15 \frac{x^4y^2}{(x^5 + y^3)^2}$

7. Determine the solution for the following separable differential equation:

$$y'(x) = \frac{e^{-3x}}{\sqrt{y-7}}, \quad y(0) = 8$$

- (a) $y(x) = 7 + \left(\frac{3-e^{-3x}}{2}\right)^{\frac{2}{3}}$
- (b) $y(x) = 9 - \frac{7e^{-3x}}{\sqrt{x+49}}$
- (c) $y(x) = 9 - \left(\frac{4-e^{-3x}}{3}\right)^{\frac{3}{2}}$
- (d) $y(x) = 4\sqrt{3 + \left(\frac{1+e^{-3x}}{2}\right)^3}$
- (e) $y(x) = \sqrt[3]{8\left(\frac{17-e^{-3x}}{2}\right)^{\frac{2}{3}}}$