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| Name: | Roll Number: |
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Endterm (Practice)
SIAS, Krea University (AY 2025-26)
Mathematical Methods for Economics (Course Code: ECON211)
25 September 2025

Maximum Points: 30

Duration: 100 minutes

Instructions and Advice:

- This is a closed book exam.
- This exam accounts for 30% of your grades.
- You need to answer 14 questions in all.
 - The first section contains 8 questions, each carrying 1 point.
 - The second section contains 4 questions, each carrying 3 points.
 - The third section contains 2 questions, each carrying 5 points.
- All questions are compulsory. Points for each question are mentioned in parentheses.
- At no point during the exam, you are allowed to ask clarificatory questions. Make reasonable assumptions if you have doubts and proceed to answer the question.
- You are not permitted to use any electronic device including calculators.
- There is plenty of time. Use it wisely, do not rush.
- Show all your work. Answers that skip steps will receive penalty.
- Please highlight your main answer(s).
- All the best!

Short Answer Questions-I

1. (1 point) Does limit for the following function $f(x) = \frac{x}{|x-1|}$ exist at $x = 1$? Explain briefly.
2. (1 point) Let $f(x) = \frac{3x^2 - 1}{3x^2 + 1}$. Find $f^{-1}(x)$.
3. (1 point) Let $f(x) = (x-1)^4(2x-3)^5$. Find $f'(x)$.
4. (1 point) Identify the interval in which the function $f(x) = \log(1 + |x|)$ is decreasing.
5. (1 point) Suppose that $\frac{x+y}{x^2+y^2} = 5$. Find $\frac{dy}{dx}$.
6. (1 point) Let $f(x) = x^3 - 3x + 2$ and $g(x) = xf^{-1}(x)$. Find $g'(0)$.
7. (1 point) Calculate: $\int_0^5 (3t^2 + 2t + 5)dt$
8. (1 point) Compute: $\int \frac{1}{(x+2)(x+3)} dx$

Short Answer Questions-II

9. (3 points) Given the demand function for *biriyani* in a restaurant in Mangalore: $p = 180 + 6q - q^2$,
 - (a) ($\frac{1}{2}$ points) Compute the total revenue.
 - (b) ($\frac{1}{2}$ points) Compute the marginal revenue.
 - (c) (2 points) Compute the revenue-maximizing price and quantity.
10. (2+1 points) Find the minimum value of the function: $f(x) = 40 + 12x + \frac{3}{x}$. Show all the necessary and sufficient conditions.
11. (3 points) Let $f(x, y) = (a\sqrt{x} + b\sqrt{y})^{3/2}$.
 - (a) (1 point) Find the degree of homogeneity.
 - (b) (2 points) Compute all first and second order partial derivatives.
12. (1+1+1 points) Let $Y = [2\sqrt[3]{K} + 3\sqrt[3]{L}]^3$. Compute the marginal products and the marginal rate of technical substitution.

Long Answer Questions

13. (5 points) Consider $f(x, y) = 2x^2 - 3xy + 3y^2 - x^3$. Find and classify all stationary points.
14. (5 points) The demand for *Jouzi Halwa* is given by $p = 60 - 2q$ and the supply is given by $p = q^2 + 12$.
 - (a) (1 point) Compute the equilibrium price and quantity.
 - (b) (1+1 points) Compute the consumer surplus and producer surplus.
 - (c) (1+1 points) Now, suppose that the government announces a price floor of ₹52. Compute the new consumer surplus and producer surplus.