MATHEMATICAL METHODS IN ECONOMICS–II

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1. Knowledge:
- Define and explain the concept of vector spaces, sub-spaces, and basis in linear algebra.
- Describe the algebraic and geometric properties of vector spaces.
- Demonstrate an understanding of scalar products, norms, and orthogonality in vector spaces.
- Identify and explain the properties and matrix representations of linear transformations.
- Analyze systems of linear equations and properties of their solution sets.
- Discuss determinants, their characterizations, properties, and applications in linear algebra.

2. Comprehension:
- Interpret geometric representations of functions of several variables through graphs and level curves.
- Explain differentiable functions and their characterizations, properties, and applications.
- Analyze second-order derivatives, Jacobian, and Hessian determinants, along with their properties and applications.
- Understand the implicit function theorem and its application to comparative statics problems.
- Differentiate homogeneous and homothetic functions and their characterizations and applications.

3. Application:
- Apply convex sets and geometric properties of functions in multi-variable optimization.
- Utilize convex and concave functions, their characterizations, properties, and applications.
- Implement quasiconvex and quasiconcave functions, along with their properties and applications.
- Solve unconstrained optimization problems using geometric characterizations and calculus, demonstrate applications.
- Solve constrained optimization with equality constraints using geometric characterizations and Lagrange's method, understand the value function and envelope theorem.

4. Analysis:
- Analyze mathematical concepts and theories related to differential equations, especially first and second order with applications.
- Evaluate the relationships between different variables and functions in economic contexts.

5. Synthesis:
- Synthesize theoretical knowledge with practical applications in economic models.
- Develop strategies for solving complex mathematical problems in economics using various techniques learned in the course.

6. Evaluation:
- Critically evaluate mathematical models and their applications in economic analysis.
- Develop and propose alternative solutions to economic problems using mathematical methods.