

The George Mason Calculus Olympiad competition will cover the following topics from single variable calculus:

1. Limits and Continuity: definitions and properties, finding the limit of a function at a point, determining whether a function is continuous at a point/on a given set, asymptotes, the Intermediate Value Theorem.
2. Derivatives: definition, geometric interpretation, differentiation rules, derivatives of elementary functions, implicit differentiation, derivatives of inverse functions, related rates, linear approximation.
3. Applications of Derivatives: the Extreme Value Theorem, the Mean Value Theorem, monotonic functions and the first derivative test, concavity, curve sketching, optimization problems, indeterminate forms, l'Hôpital's rule, antiderivatives.
4. Integrals: definition of a definite integral, geometric interpretation, properties, techniques of integration (the substitution method, integration by parts, trigonometric integrals and trigonometric substitutions, partial fractions, improper integrals).
5. Applications of Definite Integrals: area of a plane region, volumes, arc length, area of a surface of revolution.
6. Convergence tests for numerical series.