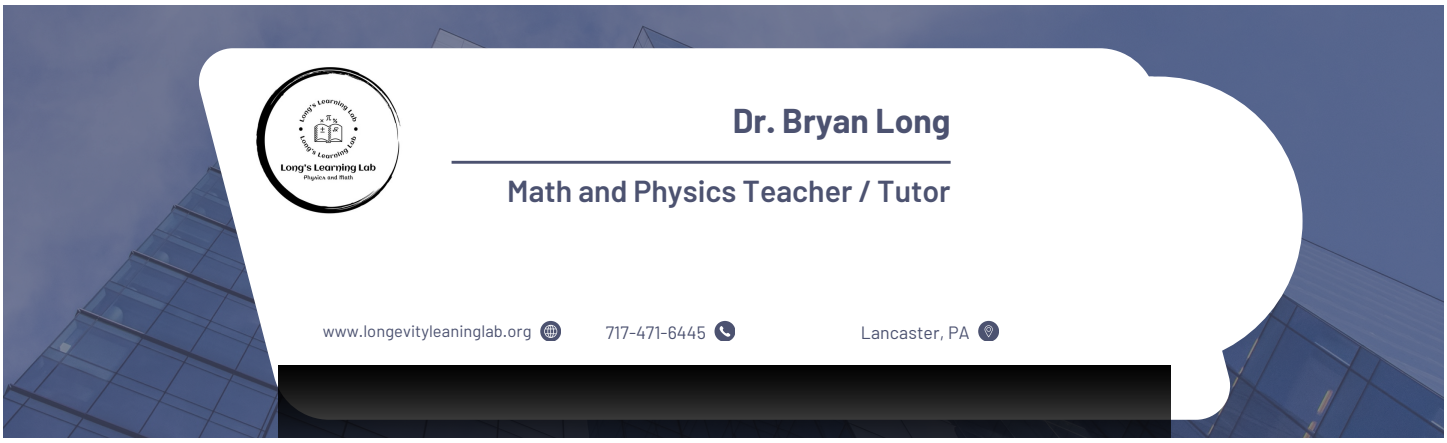


**Below is a list of topics for a general Pre Calculus / Math Analysis Class. Dr. Long can teach any of these topics and/or provide homework help. Dr. Long believes all math is a skill that needs consistent practice to master.**

Pre Calculus / Math Analysis Topics:

1. **Functions and Their Graphs:**
   - Definition of a function
   - Function notation
   - Domain and range of functions
   - Operations on functions (addition, subtraction, multiplication, division, composition)
   - Inverse functions
   - Transformations of functions (translations, reflections, stretches, compressions)
2. **Polynomial and Rational Functions:**
   - Characteristics of polynomial functions (degree, leading coefficient, end behavior)
   - Graphing polynomial functions
   - Solving polynomial equations
   - Characteristics of rational functions
   - Graphing rational functions
   - Asymptotes and holes
   - Solving rational equations
3. **Exponential and Logarithmic Functions:**
   - Exponential functions and their properties
   - Logarithmic functions and their properties
   - Graphing exponential and logarithmic functions
   - Solving exponential and logarithmic equations
   - Applications of exponential and logarithmic functions
4. **Trigonometry:**
   - Trigonometric functions (sine, cosine, tangent, cosecant, secant, cotangent)
   - Trigonometric identities

- Graphs of trigonometric functions
- Solving trigonometric equations
- Trigonometric equations and inequalities
- Law of Sines and Law of Cosines
- Polar coordinates and graphs
- De Moivre's Theorem

5. **Analytic Trigonometry:**
   - Trigonometric identities and equations
   - Sum and difference identities
   - Double and half angle identities
   - Trigonometric equations and inequalities
   - Applications of trigonometric identities
6. **Vectors:**
   - Introduction to vectors
   - Operations with vectors (addition, subtraction, scalar multiplication)
   - Dot product and cross product
   - Applications of vectors
7. **Matrices and Determinants:**
   - Operations with matrices (addition, subtraction, scalar multiplication, matrix multiplication)
   - Determinants and inverses of matrices
   - Solving systems of equations using matrices
   - Applications of matrices
8. **Conic Sections:**
   - Definition and classification of conic sections (circle, ellipse, hyperbola, parabola)
   - Graphs of conic sections
   - Writing equations of conic sections
   - Applications involving conic sections
9. **Sequences and Series:**
   - Arithmetic sequences and series
   - Geometric sequences and series
   - Recursive sequences
   - Finding sums of finite and infinite sequences
   - Mathematical induction
10. **Limits and Continuity:**
    - Understanding limits
    - Evaluating limits algebraically and graphically

- Continuity of functions
- Intermediate Value Theorem