

**Math 104**  
**Challenge Exam Information**  
**Mathematics Department**  
**San Diego Miramar College**

**Do not attempt the Math 104 Challenge Exam unless you are confident that you can successfully answer questions regarding the following topics.**

- Recognize and construct angles whose measures are given in degrees or radians, convert between radians and degrees, determine reference angles, and apply angle measurement to problems.
- Define trigonometric functions in terms of the lengths of the sides of right triangles, and apply to problems involving right triangles.
- Evaluate trigonometric functions of special angles by utilizing geometric properties of triangles.
- Define and evaluate trigonometric functions as circular functions.
- Analyze and describe the graphs of trigonometric functions and their algebraic representation in terms of their properties including the phase shift, the period, vertical shifts, the amplitude, asymptotes, and the domain and range.
- Define, evaluate, describe, and graph inverse trigonometric functions including their domains and ranges.
- Derive and prove fundamental trigonometric identities including the Pythagorean identities, the reciprocal identities, the sum and difference identities, and apply these to derive more general identities.
- Solve trigonometric and inverse trigonometric equations.
- Apply the Pythagorean Theorem, the law of sines, and the law of cosines to solve right and oblique triangles, and application problems.
- Apply the definitions of trigonometric functions to describe vector quantities in terms of their components, and in terms of their magnitude and direction.
- Apply vector algebra to problems involving vector quantities such as force, velocity and displacement.
- Perform arithmetic operations on complex numbers using both standard and trigonometric form including applications involving De Moivre's Theorem, and interpret those operations geometrically.