TOPICS and Concepts for the Math 104 Challenge Exam

NOTE:

- A calculator, cell phone, translator, dictionary or any similar device is NEVER allowed.
- NO formulas will be given.
- The problems on the 'Samples' exam contains problems similar to, but not exactly like, problems on the actual Challenge Exam. Further, the Challenge Exam may contain problems that are not expressly shown on the 'Samples' Exam.' **STUDY !!**

The Challenge Exam for Math 104 may include, but will not be limited to:

1. Given two trigonometric ratios, (a) find the remaining four trigonometric function values, and (b) find the quadrant of the sum, difference, double, or half of the original angle(s).

2. SOLVE a variety of equations:

   a) On a specified domain. e.g. $-90^o \le \theta \le 90^o$ or $0 \le x < 2\pi$.

   b) Solve for all possible solutions (e.g. $\frac{3\pi}{4} \pm 2k\pi$)

   c) Be able to express your answers in either degree or radian measure.

3. SOLVE a variety of equations, using:

   a) Reciprocal identities b) Pythagorean identities c) Double angle identities

4. GRAPH one period a function that involves a variety of transformations, that may include: period, vertical, horizontal, and amplitude changes. Be able to label the '5 key points.'

5. Simplify an expression or prove an identity, using:

   a) reciprocal identities b) double angle identities

   c) half-angle identities d) sum and/or difference identities.

6. Solve for the missing side or missing angle of a triangle using:

   a) sohcahtoa b) Law of Sines c) Law of Cosines

7. Find the area of a non-right triangle.

8. Find the principal value of an expression involving inverse trig. (e.g. $\arcsin x$ or $\cos^{-1}\theta$)

9. Perform arithmetic (add, subtract, multiply, divide, simplify) on Complex numbers, $a \pm bi$.

10. Convert from Trigonometric form ($rcis\theta$) to Standard Form ($a \pm bi$) or visversa.

11. Convert from Polar coordinates (r, θ) to Cartesian coordinates (x, y), and visversa.

12. Find the product and quotient of Complex numbers in Trigonometric form.

13. Apply DeMoivre's Theorem to find $(a \pm bi)^n$