Review Topics for Midterm I

MATH 420

- Basics

    - algebraic operations, complex conjugate, modulus and argument of a complex number z

    - Polar form of a complex number z, de Moivre's Formula, finding **powers** and **roots** of z

- Functions of a complex variable: $f(z) = u(x, y) + iv(x, y)$

    - Limits (including limits at infinity)

    - Continuity

    - Analyticity: necessary conditions for analyticity and the Cauchy-Riemann equations, sufficient conditions for analyticity

- Elementary functions: Euler's formula, $w = e^z$, $z = \log(w)$, $\sin z$, $\cos z$, principal branch of the logarithm, other multi-valued functions and principal branches of such functions

- Be familiar with all the HW problems and examples solved in class

- Useful trigonometric figures:
  $\tan \theta = \frac{\sin \theta}{\cos \theta}$
  $\sin \frac{\pi}{6} = \frac{1}{2}$, $\cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$
  $\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$, $\cos \frac{\pi}{3} = \frac{1}{2}$
  $\sin \frac{\pi}{4} = \frac{1}{\sqrt{2}}$, $\cos \frac{\pi}{4} = \frac{1}{\sqrt{2}}$
  $\sin \frac{\pi}{2} = 1$, $\cos \frac{\pi}{2} = 0$
  $\sin \frac{3\pi}{2} = -1$, $\cos \frac{3\pi}{2} = 0$
  $\sin 0 = \sin 2\pi = 0$, $\cos 0 = \cos 2\pi = 1$
  $\sin \pi = 0$, $\cos \pi = -1$