UNLV
UNIVERSITY OF NEVADA LAS VEGAS

MAT 709: Complex Function Theory - I

Fall 2007, 3 credits: Test 1

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PROBLEM 1 : (10 points) For which n is i an nth root of unity?

PROBLEM 2 : (10 points) Sketch the image under the spherical projection of a line of longitude $X = \sqrt{1 - Z^2}\cos\theta$, $Y = \sqrt{1 - Z^2}\sin\theta$, for θ fixed and $-1 \leq Z \leq 1$.

PROBLEM 3 : (10 points) Consider the transformation $\ln z$. Show the transformations of (a)circles centered at the origin, (b)rays emanating from the origin, and (c)z-plane.

PROBLEM 4 : (10 points) Let $u(x, y) = \alpha$ and $v(x, y) = \beta$, where u and v are the real and imaginary parts of an analytic function $f(z)$ and α and β are any constants, represent two families of curves. Prove that the families are orhogonal.