

Due on October 9, 2006, Monday, Class time. No late submissions!

MATH 302 Homework 1

- 1: Evaluate $\int_0^\infty \frac{dx}{1+x^\alpha}$ where $\alpha > 1$. Take into account that $z^\alpha = \exp(\alpha \ln z)$ is not defined at the origin.
- 2: Evaluate $\int_0^\infty \frac{dx}{(1+x^2)^n}$ where $n \geq 1$ is an integer.
- 3: Find a conformal mapping of the disc $x^2 + (y-1)^2 < 1$ onto the first quadrant $x, y > 0$. Investigate the conformal property of your map also on the boundaries.
- 4: Describe the image of the unit disc under the transformation $\ln \left(\frac{z-1}{z+1} \right)$, where an appropriate branch of the logarithm is used.