

Homework 1

Math 55b

Due Tuesday, 3 Feb 2009.

1. Compute the indefinite integrals $\int \tan^{-1} x \, dx$.
2. Construct a continuous bijection $f : (0, 1] \cap \mathbb{Q} \rightarrow (0, 1) \cap \mathbb{Q}$.
3. Given distinct points $a, b \in \mathbb{R}^k$, show that the locus

$$S = \{x : |a - x| = 2|b - x|\}$$

is a sphere. What is its center? What is its radius?

4. Given $z, w \in \mathbb{C}$ with $z \neq 0$, give a definition for the (multivalued) function z^w . What are the possible values for $|i^i|$ (where $i = \sqrt{-1}$)?