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T$_E$Xand L^{A}T$_E$X: Learn this.

Problem Set 0

- get stuck

- work together

- definitions

- proofs: The best proof one you thought of yourself.

- algebra, geometry, analysis, intuition

- examples

- $1^2 + 2^2 + c^2 + \cdots + n^2 = ?$

$$\int_0^3 x^2 \, dx < 1^2 + 2^2 + 3^2 < \int_0^3 (1+x)^2 \, dx$$

Rudin: Proofs are sometimes too optimal. No pictures.

Sets

- well defined? Russel's Paradox

- $A \cup B$, $A \cap B$

- maps $f : A \to B$
  one-to-one (injective), onto (surjective)
  one-to-one & onto (bijective, invertible)
  preserve some additional structure (algebraic or geometric/topological) $f : n \to 2n$
  homomorphism, isomorphism, homeomorphism, isometry

Equivalence Relation $x \sim y$

reflexive: $x \sim x$

symmetric: $x \sim y$ implies $y \sim x$

transitive: If $x \sim y$ and $y \sim z$, then $x \sim z$

EXAMPLES

1. similar triangles, congruent triangles

2. same birthday

3. integers mod 3

4. same genes (identical twins etc)

5. cardinality of sets

[Last revised: August 28, 2014]