MATH 335 Lecture 2

Chris Camano: ccamano@sfsu.edu

September 1, 2022

Definition 0.1. Archemedian principle
For any step size r you can traverse the real number line from a to b with this step and pass b at some point. This principle is later used to impy the denisty over the rationals in the sapce of real numbers.

Definition 0.2. Density Property;

$$\forall a, b \in \mathbb{R}, \exists, r \in \mathbb{Q} : a < r < b$$

Approximating square roots: Let :

$$S = \{r : r^2 < 2\}$$

S does not have a maximum due to the density of the reals.

Theorem 0.3. *Largrange's theorem: The only irrational numbers that can be expressed as a period sequence of recurring fractions are quadratic numbers.*

Can you make a theory about cubic root expansion?
Homework:

Pick :

$$0 < r \quad r^2 < 2, r \in \mathbb{Q}$$

Show that:

$$w = \frac{4}{r^2 + 2} r$$

is irrational and also show $r < w$ *and also show that* $w^2 < 2$