Thursday March 5, hours 23-24: "Argue by Contradiction"

March-05-15 9:00 AM

Finish Quiz 7 writeup? Not unless requested.

Pigeonhole is "proof by contradiction"

Start w/ $\sqrt{2}$ is irrational. (Seriously or not.)

Aside. prove that there exist $a,b \in \mathbb{R}\setminus\mathbb{Q}$ s.t. $a^b \in \mathbb{Q}$

The

$$\begin{aligned} r &= 1+\tfrac{1}{2}+\tfrac{1}{3}+\tfrac{1}{4}+\tfrac{1}{5}+\tfrac{1}{6}+\tfrac{1}{7}+\tfrac{1}{8}+\cdots \\ &> \tfrac{1}{2}+\tfrac{1}{2}+\tfrac{1}{4}+\tfrac{1}{4}+\tfrac{1}{6}+\tfrac{1}{6}+\tfrac{1}{8}+\tfrac{1}{8}+\cdots \\ &= 1 + \tfrac{1}{2} + \tfrac{1}{3} + \tfrac{1}{4} + \cdots \\ &= r, \end{aligned}$$

example?

Then a discussion of re-summation.

student work starts....

Problem 7 (Larson's 1.9.1). Given that a, b, and c are odd integers, prove that the equation $ax^2+bx+c=0$ cannot have a rational root.

Then go over 2-6 & see if there are questions.

Problem 6 (Larson's 2.6.11, modified).

1. Prove that in any group of six people there are either three mutual friends or three mutual strangers.
2. Prove that if all the edges and diagonals of a 17-gon are each coloured red, green, or blue, then you can find a single-colour triangle.
3. Can you generalize?

Define $R(n_1, n_2 \ldots n_c)$

Thm a. $R(n_1,n_2) \leq R(n_1-1,n_2)+R(n_1,n_2-1)$

b. $R_1(n_1,\ldots,n_c) \leq R(n_1,\ldots,n_{c-2},R(n_{c-1},n_c))$