

# Lecture 5

Monday, September 11, 2023 5:26 PM

\* Prayer

About the rational numbers:

$$\frac{1}{3} = 0.3333\dots$$

$$\frac{1}{6} = 0.1666\dots$$

$$\frac{1}{7} = 0.\underbrace{142857}_{\text{repeating}}\underbrace{142857}_{\text{repeating}}\underbrace{142857}_{\text{repeating}}\dots$$

$$\frac{1}{2} = 0.5000\dots = 0.49999\dots$$

It is a fact that in the decimal point representation, a rational number must have a repeating pattern.

$\pi, e, \sqrt{2}, \sqrt[3]{3}, \sqrt[4]{7}, \dots$  are irrational numbers

$\frac{\pi}{6}$  is a fraction. Is it a rational number?

If  $\frac{\pi}{6}$  is a rational number then  $\frac{\pi}{6} = \frac{p}{q}$  for some  $p \in \mathbb{Z}$  and  $q \in \mathbb{N}$ .

then  $\pi = \frac{6p}{q}$  is a rational number.

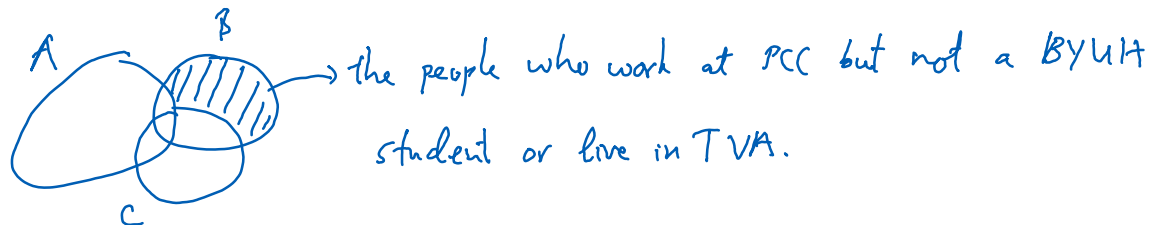
"If A then B" is a true statement. B is a false statement. Therefore, A must also be a false statement. Therefore,  $\frac{\pi}{6}$  is not a rational number.

## Venn diagram

A = set of all current BYUH students

B = set of all PCC workers

C = set of all residents of TVA.



Work on the worksheet problems (from last time).

\*Two common types of arguments (reasoning):

- Inductive argument: make a generalization from specific cases.
- Deductive argument: make a specific statement from a general rule.