

## Workshop 10: Catch up!

- Write the following in predicate logic.  $C(x) \Leftrightarrow x$  has a cat.  $D(x) \Leftrightarrow x$  has a dog.
  - All students have a cat.
  - There exists some students who have a dog.
  - All students have either a cat or a dog.
- Using laws of logic, show that  $\neg(A \Rightarrow (B \Rightarrow C))$  is equivalent to  $A \wedge B \wedge \neg C$ .
- Which of the following are true or false.
  - $\forall x \in \mathbb{N} : \exists y \in \mathbb{N} : y = x + 1$
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  - $\exists x \in \mathbb{N} : \exists y \in \mathbb{N} : x = y + 1$
- Using laws of logic, show that  $B \wedge \neg(A \Rightarrow B)$  is a contradiction.
- Write the following in set builder notation.
  - The set of fruits that come from Thailand.
  - $\{1, 3, 5, 7, 9, \dots\}$
  - $\{-3, -2, -1, 0, 1, 2, 3\}$
- Using laws of sets, show that  $(B \setminus A) \cup (B \cap (A \cup C))$  is equivalent to  $B$ .
- The relation  $R = \{ (x, y) \in \mathbb{N} \times \mathbb{N} \mid x \% y = 0 \}$  has which of the following properties:
  - reflexive
  - symmetric
  - antisymmetric
  - transitive.