

Workshop 7: Catch up!

1. Write the following in predicate logic. $C(x) \Leftrightarrow x$ has a cat. $D(x) \Leftrightarrow x$ has a dog.
 - a. All students have a cat.
 - b. There exists some students who have a dog.
 - c. All students have either a cat or a dog.

2. Using laws of logic, show that $\neg(A \Rightarrow (B \Rightarrow C))$ is equivalent to $A \wedge B \wedge \neg C$.

3. Which of the following are true or false.
 - a. $\forall x \in \mathbb{N} : \exists y \in \mathbb{N} : y = x+1$
 - b. $\forall x \in \mathbb{N} : \exists y \in \mathbb{N} : x = y+1$
 - c. $\exists x \in \mathbb{N} : \exists y \in \mathbb{N} : x = y+1$

4. Using laws of logic, show that $B \wedge \neg(A \Rightarrow B)$ is a contradiction.

5. Write the following in set builder notation.
 - a. The set of fruits that come from Thailand.
 - b. $\{1, 3, 5, 7, 9, \dots\}$
 - c. $\{-3, -2, -1, 0, 1, 2, 3\}$

6. Using laws of sets, show that $(B \setminus A) \cup (B \cap (A \cup C))$ is equivalent to B .

7. The relation $R = \{ (x,y) \in \mathbb{N} \times \mathbb{N} \mid x \% y = 0 \}$ has which of the following properties:
 - a. reflexive
 - b. symmetric
 - c. antisymmetric
 - d. transitive.