CS 70 Discrete Mathematics and Probability Theory
Spring 2015 Vazirani Discussion 1W-S

1. Is it a proposition?

- $2+2=4$
- $x+2=4$
- Arnold Schwarzenegger is a handsome man.

2. Quantifiers

Let $\mathbb{X} = \{\text{photos}\}$ and $\mathbb{Y} = \{\text{humans}\}$, which one of the following is equivalent to "Every photo is taken by some human"?

$(\forall x \in \mathbb{X})(\forall y \in \mathbb{Y})(x \text{ is taken by } y)$

$(\forall x \in \mathbb{X})(\exists y \in \mathbb{Y})(x \text{ is taken by } y)$

$(\exists x \in \mathbb{X})(\forall y \in \mathbb{Y})(x \text{ is taken by } y)$

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3. Direct Proofs

a) We call integer n an even number if and only if there exists an integer k, such that $n = 2k$. Prove that the negative of any even integer n is even.

b) Prove that the sum of any three consecutive integers is divisible by three.

4. Proof by Contraposition

Let x and y be two positive integers. Prove that if $x \times y < 36$ then $x < 6$ or $y < 6$.