# Worksheet 6 Review 2

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## Question 1

a. $\forall x \in \mathbb{N},\ P(123) \wedge P(x) \Rightarrow x \leq 123$

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**Correct Solution:**

$P(123) \wedge (\forall x \in \mathbb{N}, P(x) \Rightarrow x \leq 123)$

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b. $IsCD(x, y, d):\ d \mid x \wedge d \mid y$, where $x, y, d \in \mathbb{Z}$

$IsGCD(x, y, d):\ \forall n \in \mathbb{N},\ IsCD(x, y, n) \Rightarrow \exists d \in \mathbb{N},\ IsCD(x, y, d) \wedge n \leq d$

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**Correct Solution:**

$IsCD(x, y, d):\ d \mid x \wedge d \mid y$, where $x, y, d \in \mathbb{Z}$

$IsGCD(x, y, d): (x = 0 \wedge y = 0 \Rightarrow d = 0) \wedge (x \neq 0 \wedge y \neq 0 \Rightarrow IsCD(x, y, d) \wedge (\forall d_1 \in \mathbb{Z},\ IsCD(x, y, d_1) \Rightarrow d_1 \leq d))$, where $x, y, d \in \mathbb{Z}$

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**Notes:**

- Realized the definition of $IsGCD$ extends from previous question
- Noticed professor defines conditions in a predicate logic the following way

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$$(\text{case } 1 \Rightarrow \text{statement } 1) \wedge (\text{case } 2 \Rightarrow \text{statement } 2)$$

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- Hm... I feel puzzled about $\wedge$ operator used in between cases ( i.e. $(x = 0 \wedge y = 0 \Rightarrow d = 0) \wedge (x \neq 0...))$. At glimpse, I felt $\vee$ is more appropriate since if this case is not true, then we want other case should be true.

**Question 2**

**Question 3**