

Quiz 2

Consider the predicate logic formula $\exists y \in D. \forall x \in D. [(x = f(y)) \text{ OR } g(x)]$.

- (a) Give an interpretation so that the formula is true. Explain your answer.

Let:

$$D = \{1, 2\}$$

$g(x)$ = The integer x is odd

$f(y) = 2y$. Where y is an integer

Given $x = 1$ then the statement is always true since x is odd.

Given $x = 2$, choosing $y = 1$ will make the statement true since $x = f(y)$ will hold true.

Since the domain of $D = \{1, 2\}$ there is always $y \in D$ that makes the statement true for each $x \in D$

- (b) Give an interpretation so that the formula is false. Explain your answer.

Let:

$$D = \{1, 3, 4\}$$

$g(x)$ = The integer x is odd

$f(y) = 2y$. Where y is an integer

Given $x = 4$, $g(x)$ is false since x is even. Therefore for the statement to be true, there must exist a value $y \in D$ such that $x = f(y)$.

Since $f(y) = 2y$, there is no value $y \in D$ that makes $x = f(y)$ true therefore the statement is not true for every value $x \in D$

Try to use as small a domain as you can.