

Name: _____

1. You are given a universally quantified definition of the form $\forall x P(x)$. For a given object (i.e. set) A , i) how do you show that A **does not** satisfy the definition? ii) How do you prove that it does?

i) find a specific element $a \in A$ that does not satisfy $P(x)$.

ii) show each element in A satisfies $P(x)$.

"Let $a \in A$. ----- then $P(a)$ is true."

2. Let $*$ be the operation on $\mathbb{N}$ defined by $a * b = a$. i) Is $*$ an associative operation? ii) Is $*$ a commutative operation?

i) Yes let $a, b, c \in \mathbb{N}$. $(a * b) * c = a * c = a$

$$a * (b * c) = a * b = a.$$

ii) $1 * 2 = 1$ ~~2~~ so no.
 $2 * 1 = 2$