Name _____Quiz 2

1) Let U be the universe of all quadrilaterals, $P(x)$ be the open statement "x is a square" and $Q(x)$ be the open statement "x is a rectangle". Rephrase the statement below into a sentence that makes the logic more clear. Then Write the mathematical symbolism that represents it.

"All squares are rectangles"

For every quadrilateral x, if it is a square then it is also a rectangle.

$$\forall_{x\in U}\big(P(x) \Rightarrow Q(x)\big)$$

2) Find the negation of the statement below.

$$\exists_{x\in U}\big(Q(x) \wedge {\sim}P(x)\big)$$

$${\sim}\exists_{x\in U}\big(Q(x) \wedge {\sim}P(x)\big) \Leftrightarrow \forall_{x\in U}\Big({\sim}\big(Q(x) \wedge {\sim}\big(P(x)\big)\big)\Big) \Leftrightarrow \forall_{x\in U}\big({\sim}Q(x) \vee P(x)\big)$$

3) Let x be an integer. Prove that if x is a multiple of 4, then x is even.

Assume x is a multiple of 4. This means that $x = 4k$ for some $k \in \mathbb{Z}$. If we rewrite this we obtain $x = 2(2k)$ which shows that x is even.

OR

Claims	Reasoning
x is a multiple of 4	Premise
$x = 4k$ for some $k \in \mathbb{Z}$	Definition of multiple of 4.
$x = 2(2k)$	Algebra
$l \coloneqq 2k$	Definition of l
$x = 2l$	Plug in the value of l to the equation above
x is even	Definition of even