Mathematics 300

Quiz 9 Name: Key

You must show your work to get full credit.

Give the negations of the following sentences:

1. She studied for the exam, but failed.

In symbols:

she studied for the exam $\wedge$ failed

The negation of an "and" statement is an "or" statement.

She did not study for the exam **or** she passed.

2. For each positive number ε there is a positive number δ such that for all x, if $|x-1|<\delta$, then $|f(x)-2|<\varepsilon$.

As a first step write it symbolically

$$\forall \varepsilon>0\ \exists \delta>0\ \forall x,\ |x-1|<\delta \Rightarrow |f(x)-2|<\varepsilon.$$

The negation is

$$\exists \varepsilon>0\ \forall \delta>0\ \exists x,\ |x-1|<\delta \ \wedge\ |f(x)-2|\geq \varepsilon.$$

In English.

There is a positive number ε such that for all positive numbers δ, there exist a number x such that $|x-1|<\delta$ and $|f(x)-2|\geq\varepsilon$.