

If $|x-y| < \epsilon$ and $\epsilon > 0$, then $x=y$

we need to split this into cases.

we need to see if $x \neq y$.

$|x-y| < \epsilon$ and $\epsilon > 0$ could x be $> y$?

If so, there's a contradiction

If $|x-y| < \epsilon$ and $\epsilon > 0$, could $x < y$?
then there's a contradiction.

~~If $\epsilon = 3$, $x = 2$, $y = 1$ is $x < y$?~~

~~$|2-1| < \epsilon$~~

~~$1 < \epsilon$~~

~~$1 < 3$ No.~~

If $\epsilon = 5$, $x = 5$, $y = 11$

$|x-y| < \epsilon$

$|5-11| < \epsilon$

Then, $-6 \leq 5$.

We see that y could be greater than x .
Sometimes,

Just to verify: $0 < \epsilon < |x-y|$

There is nowhere that says x has to be less than ϵ or y has to be less than ϵ ... just the absolute value so this proof holds.