2.3.3 $\bigcap\{(a-u, a+u) ; u>0\} = \{a\}$

Let A be the intersection, let $x \in A$. then $x \in (a-u, a+u)$
so by definition of intersection, $x < a+u$ and $x > a-u$.
$x-u < a$ and $x+u > a$.
$a \in (x-u, x+u)$, $u>0$

Suppose $x > a$. Then $x = a+y$ for some $y>0$.
then $a \in (a+y-u, a+y+u)$.
Choose u where $u<y$. then $a+y-u > a$ and
$a \notin (x-u, x+u)$, contradiction

Suppose $x<a$. Then $x = a-z$ for some $z>0$.
then $a \in (a-z-u, a-z+u)$.
Choose u where $u<z$. then $a-z+u<a$ and
$a \notin (x-u, x+u)$, contradiction.

Because $x \not< a$ and $x \not> a$, $x=a$. Since the only
x for which $x \in A$ is $x=a$, $\bigcap\{a-u, a+u ; u>0\} = \{a\}$