

ordered pairs/n-tuples as collections of sets

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- *From:* Elotemuygrande <john@xxxxxxxxxxxxxxx>
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Suppose you define a 2-tuple this way, which I just found in a book.
 $T=(a,b)={{a}, {a,b}}$

Is there a way to express T_1 and T_2 , the first and second elements of the tuple in terms of standard operations on sets like intersection and union and such instead of the gibberish found on http://en.wikipedia.org/wiki/Ordered_pair ? Yes, the gibberish makes sense to me, but it doesn't feel right saying it that way. The ideas I've come up with so far break down, especially when $a=b$. The book I'm looking through just says thank God we're not doing it this way in this book and no detailed explanation. I'm also thinking about how to define n-tuples without nasty nested pairs.

Any links or ideas appreciated, this is just arm-chair math thinking.

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