

property of a function

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Hi,

I have, maybe a somehow strange question:

Let M, A be 2 sets with same order, i.e. $|M| = |A|$.

Let further be $f: M^n \rightarrow A$ a function with $f(m_1, \dots, m_n) = a$, $m_i \in M$, $a \in A$.

I know that f is specified unexactly. The reason for this, is that I'm searching now for a property description. With this property description I could check different functions if they satisfy my special property. So in fact, I am searching for something like "A function is commutative, if $f(x, y) = f(y, x)$ ". So then for example I can check if $f(x, y) = x + y$ is commutative, which is surely true.

I will describe the property, for which I am searching a formal description (like in the case, where f is commutative) now with an example:

Let $n=4$ and $f_1(m_1, m_2, m_3, m_4) = m_1 + m_2 + m_3 + m_4 = a$.

Now I can divide the function f_1 in 2 "part-functions", each computing a "part-result", e.g. the "part-functions" are:

$a_1 = f'_1(m_1, m_2) = m_1 + m_2 = f_1(m_1, m_2, *, *)$

$a_2 = f'_1(m_3, m_4) = m_3 + m_4 = f_1(*, *, m_3, m_4)$

Obviously I then have:

$a_1 + a_2 = f_1(m_1, m_2, m_3, m_4) = a$.

That means, at first I did a "part-calculation" of the "part-result" a_1 and a_2 and then I could calculate the final result with the base-operation of f (here $+$) in doing: $a_1 + a_2$.

The same is possible for a function f_2 , where I only multiply several values.

But for example, for the function $f_3(m_1, m_2, m_3, m_4) = m_1 * m_2 * m_3 + m_4$, cause there are 2 different base operations.

Sorry, if this is hard to understand, but maybe you have any ideas or it is a well known property of a function in math.

Thanks in advance,

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Malice

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