Math 5710 Wednesday, 7/08/20 Quiz 12

1. What is your name?

2. Following is our definition of a *permutation* of a finite set:

34-B. Definition of a *permutation* of a finite set:

Given $A \in \{$ finite sets $\}$, ($f \in \{$ permutations of A $\}$ $\Leftrightarrow f : A \underset{onto}{\overset{1:1}{\rightarrow}} A$)

A Is this definition compatible with your concept of a permutation? Indicate your response by circling one of the following words:

"Yes" "No"

B. Write a paragraph that explains why you circled "Yes" or why you circled "No."

Sample paragraph:

I struggled to formulate a definition for a permutation. And even after I formulated this one and checked it out with some of my colleagues, I felt compelled to try out examples of a permutation on a finite set that defied my definition. Now, I'm comfortable with it but that doesn't mean I'll remain comfortable with it. Here is why I think it compatible with my notion of a permutation as an ordering of elements of a set:

$A \in \{$ finite sets $\} \Rightarrow \exists\, n \in \mathbb{N} \ni A = \{ a_1, a_2, a_3, ..., a_n \} \ni |A| = n.$

Thus, $f : A \underset{onto}{\overset{1:1}{\rightarrow}} A$) $\Rightarrow f$ is some ordering of A's elements. Here is one possible f that I'll call " $f\,'$ " since there can be more than one such f:

$$f\,' = \{ (a_1, a_2), (a_2, a_3), (a_3, a_4,), ..., (a_{n\text{-}1} , a_n), (a_n , a_1) \}$$

Here's another permutation:

$$f\,'' = \{ (a_1, a_1), (a_2, a_2), (a_3, a_3,), ..., (a_{n\text{-}1} , a_{n\text{-}1}), (a_n , a_n) \}$$

And here's is a specific, example:

Suppose $B = \{ 1, 2, 3 \}$, then all of the permutations of B are as follows:

$\{ (1, 1), (2, 2), (3, 3) \}$, $\{ (1, 1), (2, 3), (3, 2) \}$, $\{ (1, 2), (2, 3), (3, 1) \}$,
$\{ (1, 2), (2, 1), (3, 3) \}$, $\{ (1, 3), (2, 1), (3, 2) \}$, $\{ (1, 3), (2, 2), (3, 1) \}$

Notice that ${}_3P_3 = 3! = 6$ and that we have 6 sets just above.

3. Smile. ☻