SURREAL NUMBERS CLASS QUESTIONS

Answers Seeking Questions.

Question 1. *What happens when the L contains multiple numbers that are the same?*

Question 2. *If $x \leq y$ and $y \leq z$, is $x \leq z$?*

Question 3. *Show that $1 \cdot y = y$ and $y \cdot 1 = y$.*

Question 4. *How is $x - y$ defined?*

Question 5. *What happens in addition or multiplication when there is an empty set involved?*

Question 6. *For a number y less than the greatest element if L, is $\{y, L|R\} = \{L|R\}$?*

Question 7. *If you know the the size of S_n, what is the size of $|S_{n+1}|$?*

Question 8. *Given a surreal number created on day m, how many ways are there to represent it on day n where $n \geq m$?*

Question 9. *How can you describe the elements of S_n as opposed to "created from subsets of S_{n-1}"? Or given a surreal number, how do you determine its birthday?*

Question 10. *Can we construct the real numbers in the same way that we have constructed the surreal numbers?*

Question 11. *Do surreal numbers have a cardinality greater than the real numbers?*

Questions Seeking Answers.

Question 12. *How to define division?*

Question 13. *Addition is a little confusing. For example, when doing $\frac{1}{2} + \frac{3}{4}$, I got $\{\frac{1}{2}, \frac{5}{4}|1, \frac{5}{4}\}$. How do I know not to use $\{\frac{5}{4}|\frac{5}{4}\}$?*

Question 14. *Give a pair of numbers (or subsets), how do you get a surreal number from it, when it's not necessarily the mean?*

Question 15. *Are there any surreal numbers that are not real numbers?*

Question 16. *Can we form a bijection between the set of surreal numbers and the set of natural numbers or real numbers?*

Question 17. *Is there a formula for how many ways a number can be represented?*

Question 18. *How would we define function between the surreal numbers? Since it obeys a somewhat similar ordering property compared to the real numbers, can we define notions of metric or norm and therefore understand continuity?*

Question 19. *Given any rational number x, how can I determine its birthday?*

Question 20. *How can you define irrational numbers like π or complex numbers like i with surreal numbers?*

Question 21. *Is there any way to order how "simple" the representation of any surreal number is?*

Question 22. *How does the mathematics community define the "simplest number"?*

Question 23. *How do we simplify the surreal numbers?*

Question 24. *(Surreal Numbers, Question 12) Can you characterize the numbers that lie in S_n, as a subset of the real numbers? What can you say about the size of $|S_n|$?*

Consider the union $S_* = \bigcup_{n\in\mathbb{N}} S_n$. Is it countable or uncountable? Can you characterize the numbers that lie in S_*?