

# Surreal Numbers

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1. Define  $0 := \{\}$ .
2. Show  $0 \leq 0$ .
3. Show  $0 \geq 0$ .
4. Show  $0 = 0$ . Now we have a number.
5. Define  $1 := \{0\}$ .
6. Show  $1 \not\leq 0$ .
7. Show  $1 \geq 0$ .
8. Show  $1 \neq 0$ .
9. Show  $1 \leq 1$ .
10. Show  $1 \geq 1$ .
11. Show  $1 = 1$ . Now we have two numbers, in order!
12. Define  $-1 := \{0\}$ .
13. Show  $-1 \leq 0$ .
14. Show  $-1 \not\geq 0$ .
15. Show  $-1 \neq 0$ .
16. Show  $-1 \leq -1$ .
17. Show  $-1 \geq -1$ .
18. Show  $-1 = -1$ .
19. Show  $-1 \leq 1$ .
20. Show  $-1 \not\geq 1$ .
21. Show  $-1 \neq 1$ . Now we have three numbers, in order!
22. What about  $\{0|0\}$ ? Not a number.