

Worksheet 2

Monday, October 7, 2019

Math 205

1. You have been assigned into groups of three or four for the week. Write down your colleagues' names and email addresses.

2. The set of real numbers, \mathbb{R} , comes equipped with several operations: addition (+), subtraction (-), multiplication (\times or \cdot), and division (\div or $/$). They also come with an ordering relation $<$, or you might prefer to talk about $>$ or \geq or \leq .

Suppose we add two symbols ∞ and $-\infty$. What is your first idea for how we should define $+$, $-$, \times , \div , and $<$ on this bigger set?

3. The operations satisfy many compatibilities between each other, and with the ordering relation, for example:

(a) For all $x, y, z \in \mathbb{R}$ we have $(x + y) + z = x + (y + z)$.

(b) For all $x, y \in \mathbb{R}$, if $x > 0$ and $y > 0$ then $x \cdot y > 0$.

Brainstorm more compatibilities like this.

4. Which compatibilities still hold in your extended number system? Which ones fail, or fail in some cases? Do you want to revise your choices in #2?