

**Homework #6. Due: Thurs 10/19**

1. What does it mean to say that there are more real numbers than natural numbers? Explain in your own words how Cantor proved this. (You don't have to provide every detail in his proof.)
2. What is  $\wp(\mathbb{N})$ ? In what sense is  $\wp(\mathbb{N})$  larger than  $\mathbb{N}$ ?
3. Is  $\langle 3, 5, 7, \dots, 1 \rangle$  a well-ordering? Why or why not? Is  $\langle 1, 2, 4, 5, \dots, 0, 3 \rangle$  a well-ordering? Why or why not? In what sense are these two sets different?
4. As sets, how are  $\emptyset$  and  $\{\emptyset\}$  different? How are  $\emptyset$  and  $\{\{\emptyset\}\}$  different?
5. What is the distinction between an ordinal number and a cardinal number? How are  $\mathbb{N}$ ,  $\omega$  and  $\aleph_0$  similar? How are they different?
6. *Explain:* The infinity of the Infinitely Big is *smaller* than the infinity of the Infinitely Small.