Because Georg Cantor’s work on the infinite revolutionized our mathematical understanding of the infinite, it is critical that you understand exactly what Cantor did and how he did it. For this assignment write a short but complete 3 – 4 page paper (typed) on Cantor’s work. Your paper should emphasize at least the following four ideas:

1. How Cantor used the notion of one-to-one correspondence to show how different sets could have the same cardinality (which got around the paradox where two sets, one obviously larger than the other, seemed to have the same number of points),

2. How Cantor showed that \( \mathbb{N}, \mathbb{Z}, \text{ and } \mathbb{Q} \) (the natural numbers, the integers, and the rational numbers) as well as other sets of numbers all were countably infinite.

3. Cantor’s Famous Diagonalization Argument in which he proved that there was no one-to-one correspondence between \( \mathbb{N} \), the set of natural numbers, and \( \mathbb{R} \), the set of real numbers (note your paper must contain a complete and accurate description of Cantor’s argument).

4. Results obtained from Cantor’s famous diagonalization argument! Cite and discuss a number of results obtained from Cantor’s work. This is where things really get interesting!

Base your essay on class notes and the text books since all the material you need can be found there. If used, be sure to properly cite any quotations taken from the text books (just give author and page number).

Your essay should be clear, concise, complete and correct. Show me you understand Cantor’s work and Cantor’s proofs. Writing well is important so make sure you read your essay out loud to correct any and all mistakes in grammar and wording.

Please attach this assignment sheet to your paper when you hand it in.