Math 108, problem set 10
Outline due: Wed Apr 27
Completed version due: Mon May 09
Last revision due: TBA

Exercises (to be done but not turned in): 21.4, 21.7, 21.12.
Problems to be turned in: All numbers refer to problems in the Yellow Book.

1. 21.5.

2. (a) Prove that $(-1, 1) \approx \mathbf{R}$. (Suggestion: See old homework.)
   (b) Prove that for $a, b \in \mathbf{R}$, $a < b$, we have $(a, b) \approx (-1, 1)$.
   (c) Prove that for $a, b \in \mathbf{R}$, $a < b$, we have $(a, b) \approx \mathbf{R}$.

3. 21.8.

4. 21.10.

5. 21.16.

6. Define a *text* in English to be a finite sequence of letters A–Z, the character SPACE, and the digits 0–9.

   (a) Carefully prove that the number of texts of length at most 10^{60} is finite. (Note that 10^{60} is larger than the number of particles in the known universe, which means that effectively, there are only finitely many possible books in the universe.)

   (b) Now let T be the set of all possible texts of any length. Prove that there exists an injective map from $\mathbf{N}$ to T, and prove that T is infinite.