MAT 320: PROBLEM SET 2

DUE MONDAY SEPTEMBER 20

**Problem 1:** Let \( a, b \in \mathbb{R} \), with \( a < b \). Find a bijective map from \( \mathbb{R} \) to the following sets:

(i) \((a, b)\)
(ii) \((a, \infty)\)
(iii) \([a, b)\)
(iv) \([a, b]\)

**Problem 2:** The interior of \( A \), \( \text{int}(A) \) is defined as \( \{ x \in A : \text{there exists } \epsilon > 0, \text{ with } (x - \epsilon, x + \epsilon) \subset A \} \). The boundary of a set \( A \subset \mathbb{R} \) is defined as \( \partial A = \overline{A} \setminus \text{int}(A) \). Show that \( \partial A \) is closed and that \( \overline{A} = A \cup \partial A \).

**Problem 3:** Let \( a, b \in \mathbb{R} \) with \( a < b \). Construct an open cover of \((a, b)\) so that it has no finite subcover.

**Problem 4:** Chapter 1.3 Question 22.

**Problem 5:** Chapter 1.3 Question 23.

**Problem 6:** Chapter 1.4 Question 28.