1. Prove that an open ball in a metric space is an open set.

2. Prove that the union of any collection of open sets is an open set.

3. Use problems 1 and 2 to show that in any metric space, a set A is open iff it is a union of open balls.

4. Prove that the union of two closed sets is closed. Hint: Use DeMorgan's Law, $(A \cap B)^c = A^c \cup B^c$.

<div align="center">Extra Credit Problems</div>

5. Prove that the two definitions of *limit point* given in Section 1 are equivalent.

6. Finish the proof of Theorem 1 in Section 1.