Assignment 1

Required Reading for Part I of course:
Epp, Chapters 1–5, 7–10. I recommend that you read these chapters in the order: 5, 1–4, 10, 7–9. Hungerford, Sections 1–8 (see handout).

Instructions: Carefully read and follow the guidelines in the handout "How to solve and write up homework problems." For example, be sure to hand in each problem separately because each problem will be separately graded. For Problem 1 only, email your essay to Sherman from your named computer account.

Problem 1: Richard's Paradox
Epp, Section 5.3: Problem 40 on page 314. Express your answer as a carefully and thoughtfully written brief essay.

Problem 2: Rational Numbers
Prove: If x is any real number, then x is a rational number if and only if its decimal representation is finite or ends with an infinitely repeating finite pattern.

Problem 3: Symmetric Difference
For any sets A and B, let $A\Delta B = (A - B) \cup (B - A)$ denote the *symmetric difference* of A and B. Which of the following statements are true for all sets A, B, and C. Carefully prove your answers.

a) $(A\Delta B)\Delta C = A\Delta(B\Delta C)$

b) $A\Delta A = A$

c) $A\Delta(B \cap C) = (A\Delta B) \cap (A\Delta C)$

d) $A \cap (B\Delta C) = (A \cap B)\Delta(A \cap C)$

e) $A\Delta(A\Delta A) = A$

f) $(A \subseteq B) \Rightarrow ((A\Delta C) \subseteq (B\Delta C))$