MAT 243: Written Homework 3
Due Friday September 16, 2011

From Textbook (Rosen, 7th ed.)

§1.7 (page 91): 2, 6, 16, 24, 28

Chapter 1 Supplementary Exersices (page 111): 4a), 20, 32

§2.1 (page 125) 6, 8, 14, 16, 20, 26, 32(b), 42(b)(d)

§2.2 (page 136) 4, 14, 18(c)(d). Note: if Venn Diagram is used in a proof, clearly shade the relavent regions and indicate the corresponding set represented by each shade.

Additional Problems

A1 Let \(a, b \in \mathbb{R}\). Prove that, if \(a + b = 2c\), then \(a \leq c\) or \(b \leq c\).

A2 Let \(a, b, c, d \in \mathbb{R}^+\). Prove that, if \(abc \geq d^6\), then \(a \geq d\) or \(b \geq d^2\) or \(c \geq d^3\).

A3 Define sets

\[
A = \{x \in \mathbb{Z}^+ \mid \text{x is odd}\}
\]

\[
B = \{x \in \mathbb{Z}^+ \mid \text{x is even}\}
\]

\[
S = \{x \in \mathbb{Z}^+ \mid \exists a \in A, b \in B \ (x = a + b)\}
\]

Prove

\(S \subset A.\) Note: you need to prove two things: \(S \subseteq A\) and \(S \neq A\)