CSE 321: Discrete Structures
Assignment #2
April 12, 2002
due: Friday, April 19

1. Section 1.3, exercise 10, parts b and d.

2. Section 1.3, exercise 12, parts c, d, e, h, i.

3. Let $Q(A, B)$ be the statement "$A \subseteq B$". If the universe of discourse for both A and B is all sets of integers, what are the truth values of the following? Justify your answers.

   (a) $(\forall B)Q(\{1, 4\}, B)$
   (b) $(\exists B)Q(\{1, 4\}, B)$
   (c) $(\exists A)(\exists B)Q(A, B)$
   (d) $(\forall A)(\exists B)Q(A, B)$
   (e) $(\forall B)(\exists A)Q(A, B)$
   (f) $(\exists A)(\forall B)Q(A, B)$
   (g) $(\exists B)(\forall A)Q(A, B)$
   (h) $(\forall A)(\forall B)Q(A, B)$

4. Which of the following statements are true? Justify your answers.

   (a) $1 \in \{1, 2\}$
   (b) $1 \subseteq \{1, 2\}$
   (c) $\{1\} \in \{1, 2\}$
   (d) $\{1\} \subseteq \{1, 2\}$
   (e) $\phi \in \{1, 2\}$
   (f) $\phi \subseteq \{1, 2\}$
   (g) $\{\phi\} \subseteq \{1, 2\}$

5. Section 1.4, exercise 22, parts c and d.

6. Section 1.5, exercise 10, part e. Give a careful proof, using the format of proofs in lecture, with a justification for each line of your proof.

7. Carefully prove the following implication, using the format of proofs in lecture:

$$(A \cap B = A) \rightarrow (A \subseteq B).$$