1 Section 3.1

Ex. 2 All of the statements are true except (f). The set A doesn't have element 2 (that means that $\{2\}$ is not a subest of A). A has $\{2\}$ as an element, and therefore $\{\{2\}\}$ is a subset of A.

Ex. 4 All of the statements except (a) and (b) are true. Here Φ is an empty set.

Ex. 6 Set A contains all nonzero integers (negative and positive). B also contains all non zero integers. Therefore (a) is true.

Ex. 7 (a) $\forall x[x \in A \rightarrow x \in B] \wedge \exists x\ [\ x \in B \wedge x \notin A]$. The second part of the above statement says that there exists at least one element in B that is not an element of A, for A to be a proper subset of B.

Ex. 8 There is only one empty subset of A.

Ex. 12 (b) In set A there are 6 even integers and $|A|-6$ odd integers. $C(6,4)$ is the number of selecting 4 even integers.

Ex. 15 Discussed in the class

Ex. 20 Given the sequence to end with 1 and 7, the integers allowed are $\{2,3,4,5,6\}$. Any subset of these allowed integers can be written as an increasing sequence. For example the subset $\{3,6,4\}$ will realize an increasing sequence $1,3,4,6,7$.

Ex. 24 Consider all binary strings of length 4. Then associate 0000 with empty set (Φ) and 1111 with the set $\{w,x,y,z\}$. The rest of the association should be easy.

Section 3.1

Ex. 5 Z^+: set of positive integers; Q^+: set of positive rational numbers; R: set of all rationals; C: set of complex numbers. You can ignore questions (g) and (h).

Ex. 6 Easy

Ex. 12 The dual statement of $A \cap B = A$ (i.e. $A \subseteq B$) is $A \cup B = A$. But $A \cup B = A$ is equivalent to $B \subseteq A$, so the dual of $A \subseteq B$ is the statement $B \subseteq A$.

Ex. 16 Mainly use Distributive law of $\cap$ over $\cup$, commutative law.

Ex. 17 Easy: $A - B$ is equivalent to $A \cap \bar{B}$.

Ex. 18

$$\cup_{i=1}^{7} A_i = A_7 = \{1, 2, 3, ..., m-1, m\}$$

Section 3.3

Ex. 2 The universe has 2000 automobiles. Consider A= set of batteries with defective terminals; and B= batteries with defective plates. Now $|\bar{A} - \bar{B}| = 1920$. Now obtain $|A \cup B|$ from this and the rest should be easy.

Ex. 4 Easy

Ex. 7 (b) Only way both "MAN" and "ANT" can appear in the permutation when "$MANT$" appears.

Ex. 9 Solved in the class.