## Section 2.1 answers

**4.** Recall that one set is a subset of another set if every element of the first set is also an element of the second.

**a)** The second condition imposes an extra requirement, so clearly the second set is a subset of the first, but not vice versa.

**b)** Again the second condition imposes an extra requirement, so the second set is a subset of the first, but not vice versa.

**c)** There could well be students studying discrete mathematics but not data structures (for example, pure math majors) and students studying data structure but not discrete mathematics (at least not this semester—one could argue that the knowing the latter is necessary to really understand the former!), so neither set is a subset of the other.

**8.** **a)** Since the set contains only integers and $\{2\}$ is a set, not an integer, $\{2\}$ is not an element.

**b)** Since the set contains only integers and $\{2\}$ is a set, not an integer, $\{2\}$ is not an element.

**c)** The set has two elements. One of them is patently $\{2\}$.

**d)** The set has two elements. One of them is patently $\{2\}$.

**e)** The set has two elements. One of them is patently $\{2\}$.

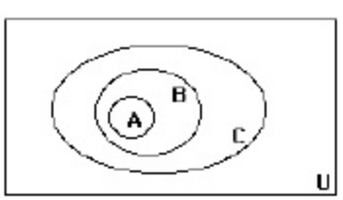
**f)** The set has only one element, $\{\{2\}\}$; since this is not the same as $\{2\}$ (the former is a set containing a set, whereas the latter is a set containing a number), $\{2\}$ is not an element of $\{\{\{2\}\}\}$.

**10.** **a)** true **b)** true **c)** false—see part (a) **d)** true

**e)** true—the one element in the set on the left is an element of the set on the right, and the sets are not equal

**f)** true—similar to part (e) **g)** false—the two sets are equal

**14.** We put the subsets inside the supersets. Thus the answer is as shown.




**24.** **a)** The power set of every set includes at least the empty set, so the power set cannot be empty. Thus $\emptyset$ is not the power set of any set.

**b)** This is the power set of $\{a\}$.

**c)** This set has three elements. Since 3 is not a power of 2, this set cannot be the power set of any set.

**d)** This is the power set of $\{a, b\}$.