

Problems from Section 2.1

6. 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 $\{\{\{2\}\}\}$.
8. 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
18. The cardinality of a set is the number of elements it has.
a) The empty set has no elements, so its cardinality is 0.
b) This set has one element (the empty set), so its cardinality is 1.
c) This set has two elements, so its cardinality is 2.
d) This set has three elements, so its cardinality is 3.
22. 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 $\{a, b\}$.