2.1

8.
a) No, {2} is not an element of the set.
b) No, {2} is not an element of the set.
c) Yes, {2} is an element of the set.
d) Yes, {2} is an element of the set.
e) Yes, {2} is an element of the set.
b) No, {2} is not an element of the set.

20. a) 0
b) 1
c) 2
d) 3

22. Yes, different sets have different power sets and thus the contrapositive must be true i.e. the same sets have identical power sets.
42. a) it is true that there exists some real number, x, such that x^3 = -1
b) It is true that there exists some integer, x, such that x+1>x
c) It is true that for all x in the set of integers, x-1 is also in the set of integers
d) It is true that for all x in the set of integers, x^2 is also in the set of integers

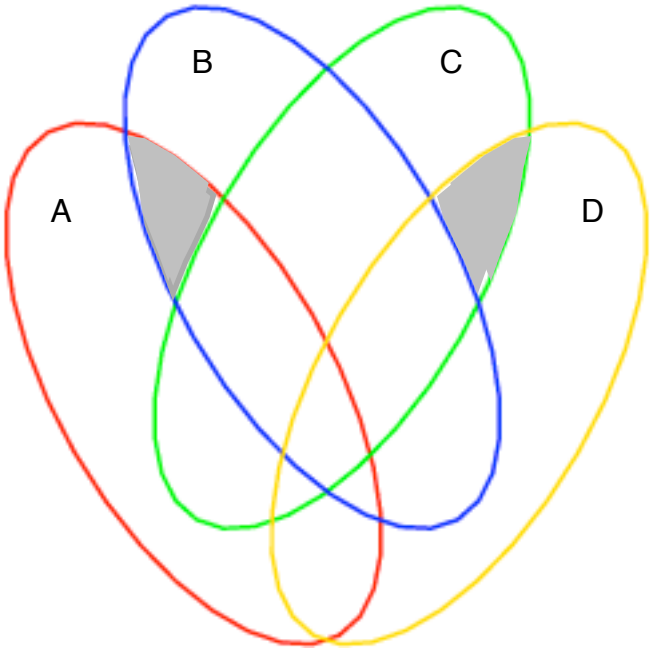
2.2

12. $A \cup (A \cap B) = A$, we can see this as A intersect B will yield whatever values are in both A and B, which means regardless of what B is (even if it is the universal set or empty set), the result of A intersect B will not contain any values not already in A. So, the result of this intersection unionized with A, will not contain any values not already in A, and it will not miss any elements in A because we are taking the union with A, which means we will only have elements of A, nothing more or less.
14. A={1,3,5,6,7,8,9}, B={2,3,6,9,10}

18. c) We can see this is true because there exists no set for B, such that A - B is $\subsetneq$ A, i.e. there exists no set such that subtracting said set from another set results in new values being added to the other set (there is no way to add elements to a set through subtraction). Therefore, A-B must result in a subset of A (note that this stands true even when B is the empty set as a set is a subset of itself), and following this operation we are subtracting the same set from both sides, which means the statement stands true.
24. Where $\bar{C}$ denotes the complement of C
$(A \cap \bar{B}) \cap \bar{C} = (A \cap \bar{C}) \cap \bar{} (B \cap \bar{C})$
$(A \cap \bar{B}) \cap \bar{C} = (A \cap \bar{C}) \cap (\bar{B} \cup C)$
$(A \cap \bar{B}) \cap \bar{C} = (A \cap \bar{C} \cap \bar{B}) \cup (A \cap \bar{C} \cap C)$
$(A \cap \bar{B}) \cap \bar{C} = (A \cap \bar{C} \cap \bar{B}) \cup (A \cap \varnothing)$

$A \cap \bar{B} \cap \bar{C} = A \cap \bar{C} \cap \bar{B}$ which are equivalent

28. a)



30. a) No.
b) No.
c) Yes.

50 c) Union is all positive real numbers and Intersection is {0}