Problem set 1 - Set theory

1. What is a set?
2. What is an element of a set?
3. What is the cardinality of a set?
4. What is a universal set?
5. What is the complement of a set (relative to a universal set)?
6. What is a powerset?
7. What is the union of two sets?
8. What is the intersection of two sets?
9. What is the set difference between two sets?
10. What is the symmetric difference of two sets?
11. Solve for x: $2x + 3 = 7$.
12. Solve for x: $3(x - 2) = 9$.
13. Solve for x: $5x - 4 = 2x + 8$.
14. Solve for x: $x^2 - 4 = 0$.
15. Solve for x: $x^2 - 5x + 6 = 0$.
16. Solve for x: $(x/3) + 2 = 5$.
17. Solve for x: $2(x + 1) = 3x - 1$.
18. Solve for x: $x^2 + 2x - 8 = 0$.
19. Solve for x: $4x - 5 = 3(x + 2)$.
20. Solve for x: $2(x - 3) = 4x + 1$.

1. A set is a well-defined collection of distinct objects.
2. An element is an individual member of a set.
3. The cardinality is the number of elements in a set.
4. The universal set contains all the objects under discussion.
5. The complement of a set (relative to a universal set) is the set of all elements in the universal set that are not in the given set.
6. The powerset is the set of all possible subsets of a set.
7. The union of two sets is the set containing all elements that are in either or both sets.
8. The intersection of two sets is the set containing only the common elements of both sets.
9. The set difference between two sets is the set of elements that are in one set but not in the other.
10. The symmetric difference of two sets is the set of elements that are in either set but not in both.
11. $2x + 3 = 7 \Rightarrow x = 2$.
12. $3(x - 2) = 9 \Rightarrow x = 5$.
13. $5x - 4 = 2x + 8 \Rightarrow x = 4$.
14. $x^2 - 4 = 0 \Rightarrow x = 2$ or $x = -2$.
15. $x^2 - 5x + 6 = 0 \Rightarrow x = 2$ or $x = 3$.
16. $(x/3) + 2 = 5 \Rightarrow x = 9$.
17. $2(x + 1) = 3x - 1 \Rightarrow x = 3$.
18. $x^2 + 2x - 8 = 0 \Rightarrow x = 2$ or $x = -4$.
19. $4x - 5 = 3(x + 2) \Rightarrow x = 11$.
20. $2(x - 3) = 4x + 1 \Rightarrow x = -7/2$.