Basic mathematical concepts

Names:

1. Let X be a finite set. Give a recursive definition of the set of subsets of X (the Power set of X). Use union as the operator on the definition

2. Prove by induction on n that $\sum\limits_{i=0}^{n} n = \dfrac{n(n+1)}{2}$

3. Using the tree below, give the values of each of the items:
    a. the depth of the tree
    b. the ancestors of x_{18}
    c. the internal nodes of the tree
    d. the length of the path from x_3 to x_{14}
    e. the vertex that is the parent of x_{16}
    f. the vertices children of x_7