Basic mathematical concepts

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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

X={d,a,f}

P(X)= {{},{d},{a},{f},{d,a},{d,f},{a,f},{d,a,f}}

Basis: {} E P(X)

Recursive case: X={d,a} U {f} => Y U {z}

P(X)={{},{d},{a},{d,a}} U {{f},{d,f},{a,f},{d,a,f}}

P(X)={ )={{},{d},{a},{d,a},{f},{d,f},{a,f},{d,a,f}}

Closure: n E P(X) only if it can be obtained from the basis using a finite number of the recursive step

1. Prove by induction on *n* that

Basis: 0=0

Inductive hypothesis:

Inductive step:

* 0+1+2 +… +k+(k+1) =
* =
* =
* =

1. Using the tree below, give the values of each of the items:
   1. the depth of the tree -🡪 The depth of the tree is 4
   2. the ancestors of x18. -🡪 The ancestors of x18 are: x15,x10,x4,x1
   3. the internal nodes of the tree -🡪x1,x2,x3,x4,x5,x7,x10,x13,x15
   4. the length of the path from x3 to x14. -🡪 The length of the path is 2
   5. the vertex that is the parent of x16 -🡪 x10 is the parent vertex
   6. the vertices children of x7 -🡪 The vertices children from x7

are x13 and x14

