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Implementación de Métodos Computacionales
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Herramientas Básicas

Fuente: J.E Hopcroft, J.D. Ullman. Introduction to Automata Theory, Languages, and Computation, Addison-Wesley, (1979), pp. 10-11

1.1 In the tree of Fig. 1.4,

a) Which vertices are leves and which are interior vertices?
   a. Leaves: 2,4,6,8,9.
   b. Interior: 1,3,5,7.

b) Which vertices are the sons of 5?
   a. Sons of 5: 7,8.

c) Which vertex is the father of 5?
   a. Father of 5: 3.

d) What is the length of the path from 1 to 9?
   a. Length path from 1 to 9: 4.

e) Which vertex is the root?
   a. Root: 1.

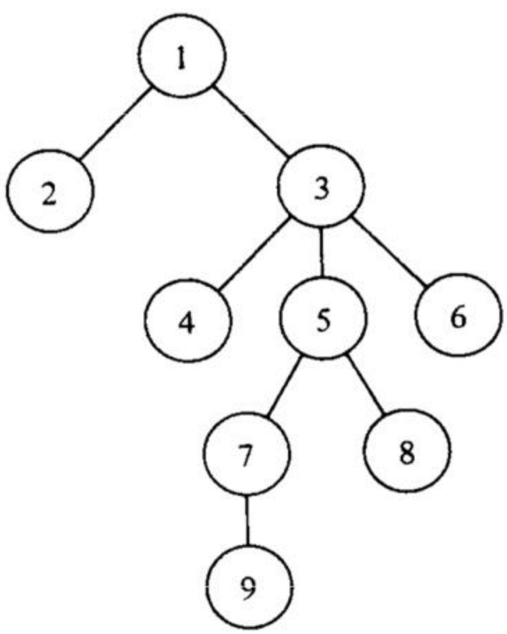

Fig. 1.4 A tree.

1.2.- Prove by induction that N on:

$$\text{a)} \sum_{i=0}^{n} i = \frac{n(n+1)}{2}$$

a) $\sum_{i=0} i = \frac{n(n+1)}{2} \Rightarrow$ ① Caso Base $n=1 \Rightarrow 1 = \frac{1(1+1)}{2} \Rightarrow 1 = 1$

$n=3 \Rightarrow 1+2+3 = \frac{3(3+1)}{2} = 6 = 6$

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② Caso donde $n=k$ $\sum_{i=0}^{k} i = \frac{k(k+1)}{2}$

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③ Caso $n=k+1$ $\sum_{i=0}^{k+1} i = \frac{k+1(k+2)}{2} \Rightarrow \sum_{i=0}^{k} i + k+1 = \frac{k+1(k+2)}{2}$

$$\frac{k(k+1)}{2} + \frac{k+1}{1} = \frac{(k+1)(k+2)}{2} \Rightarrow \frac{k(k+1)+2(k+1)}{2} = \frac{(k+1)(k+2)}{2}$$

$$\frac{k^2+k+2k+2}{2} = \frac{k^2+2k+k+2}{2} = \frac{k^2+3k+2}{2} = \frac{k^2+3k+2}{2}$$