P733 9

2.

P733 13

Graphs that have no edges.

P755 13

a) 3.

b) 3+2+4=9

P756 21

500+250+125+62+31+16+8+4+2+1=999

999 games must be played.

P769 9

At least 3 weighings are needed. There are several algorithms that can find the counterfeit coin using 3 weighings.

1) We can weigh coins 1, 2, 3 and coins 4, 5, 6 at first. If equal, we can weigh coins 7, 8, 9 and coins 10, 11, 12 and then randomly weigh two coins of the lighter side. If unequal, we can randomly weigh two coins of the lighter side.

2) We can weigh coins 1, 2, 3, 4 and coins 5, 6, 7, 8 at first. If equal, we can weigh coins 9, 10 and coins 11, 12 and then weigh the two coins of the lighter side. If unequal, we can use 2 weighings to find the counterfeit coin in the lighter side.

P770 21

a 000

e 001

i 01

k 1100

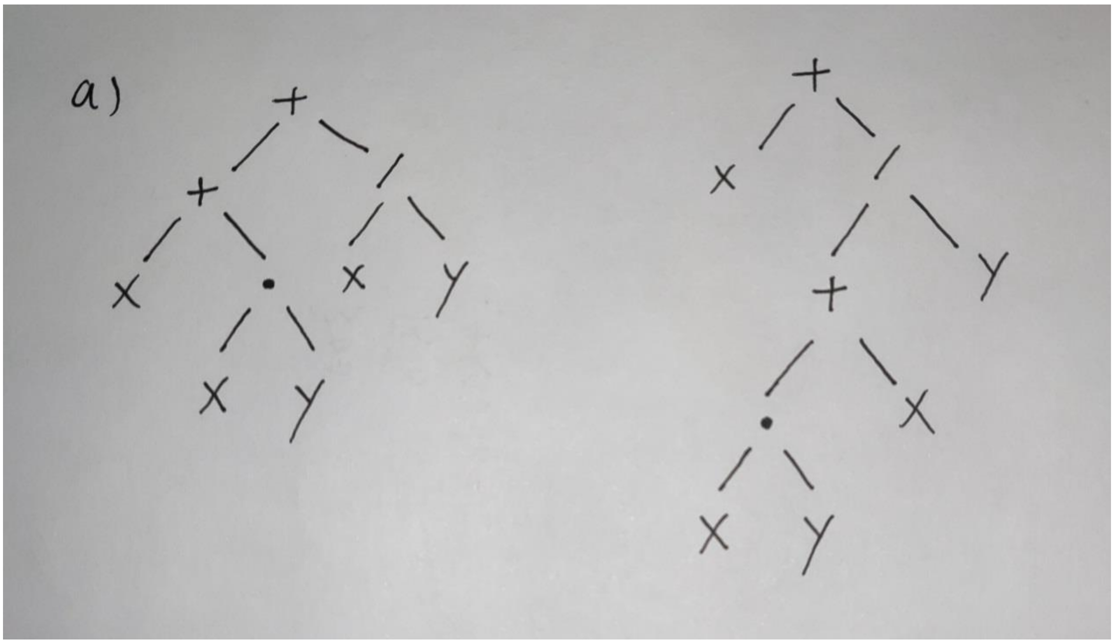
o 1101

p 11110

u 11111

P784 17

a)



b) ++x·xy/xy   +x/+·xyxy

c) xxy·+xy/+   xxy·x+y/+

d) ((x+(x·y))+(x/y))   (x+(((x·y)+x)/y))

P784 27

We can use mathematical induction. Let $P(n)$ be the statement that an ordered rooted tree is uniquely determined when a list of n vertices generated by a postorder traversal of the tree and the number of children of each vertex are specified.

Basic step:

If there is only one vertex, $P(1)$ is obviously true.

Inductive step:

Assume that $P(n)$ is true. Then for $P(n+1)$, we can find the last leaf in the list, which is the last vertex with no children. We remove this leaf, which is the last child of its next vertex in the list, and n vertices are left. By the inductive hypothesis, we can have $P(n+1)$ is true.

So an ordered rooted tree is uniquely determined when a list of vertices generated by a postorder traversal of the tree and the number of children of each vertex are specified.

P796 21

Breadth-first search:

Proof: According to the breadth-first search, we first choose one vertex of degree m as the root. Then all the vertices of degree n and the incident edges are added to the tree. Finally the rest vertices of degree m are added to the tree.

Description: The trees are of height 2. A vertex of degree m is the root, and all the vertices of degree n are at level 1. The rest n-1 vertices of degree m are at level 2, each with an edge connected to one vertex at level 1.

Depth-first search:

Proof: According to depth-first search, we can get one path when $m=n$ or $|m-n|=1$. Otherwise, the path will end at a vertex in the larger partite set, then we back up and can visit the rest vertices.

Description: If $m=n$ or $|m-n|=1$, the trees produced consist of only one path.

If $m-n>1$, the longest paths of trees pass through n vertices of degree m and n vertices of degree n. The rest vertices of degree n are each connected to the last vertex of degree m with an edge.

If $n-m>1$, the longest paths of trees pass through m vertices of degree n and $n+1$ vertices of degree m. The rest vertices of degree m are each connected to the last vertex of degree n with an edge.

P802 5

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