Math 322

Q5/ (Ex) Decision Tree

12 coins, 1 fake (Heavy? light?)

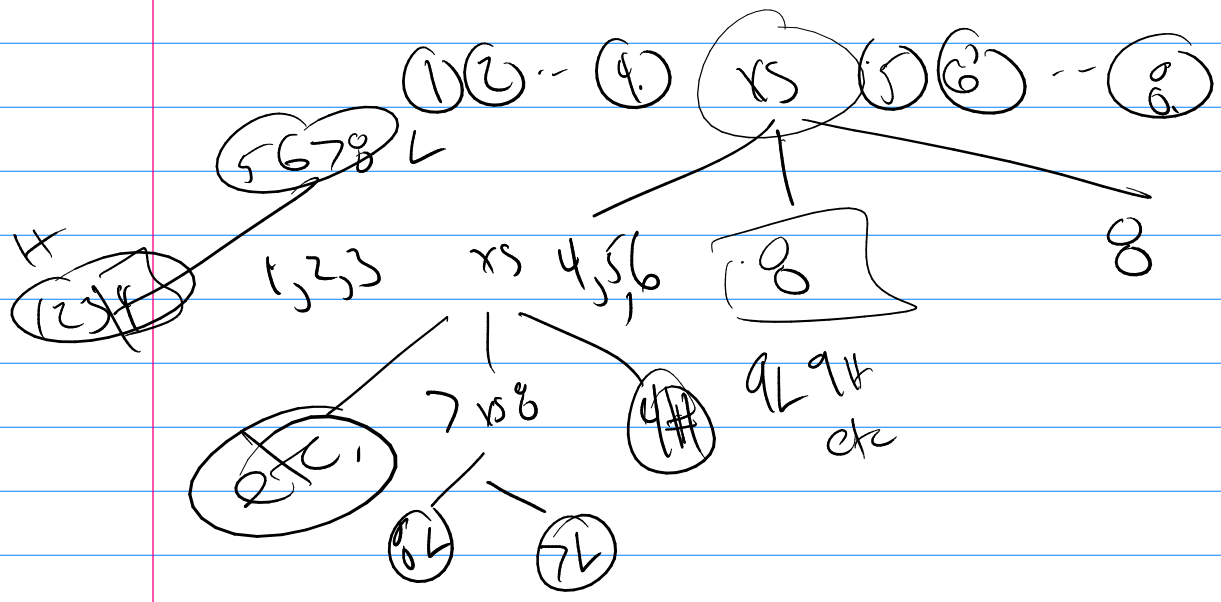
→ outcomes: 1H, 1L, 2H, ..., 12L

|Outcomes| = 24 (= leaves)

$h \geq \lceil \log_m 24 \rceil$ (th$^{\text{m}}$)

our example $h \geq \lceil \log_3 24 \rceil$

$h \geq 3$

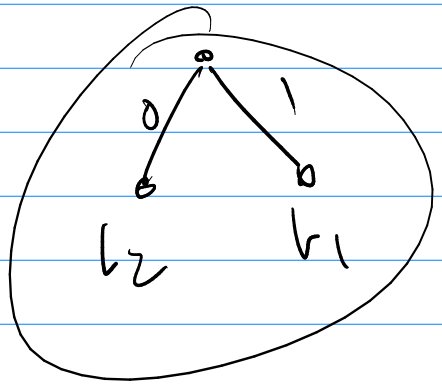


Q5 Huffman Coding

	l_1	l_2	l_3
prob.	p_1	p_2	p_3

ex: $p_1 \leq p_2 \leq p_3$

↑ create ⊂ subtree



$p_c = p_1 + p_2$

l_c

Qs 10.2(2) oenology, phrenology, ...

oendogy

campandogy

phrendogy

ornithology

(finish)

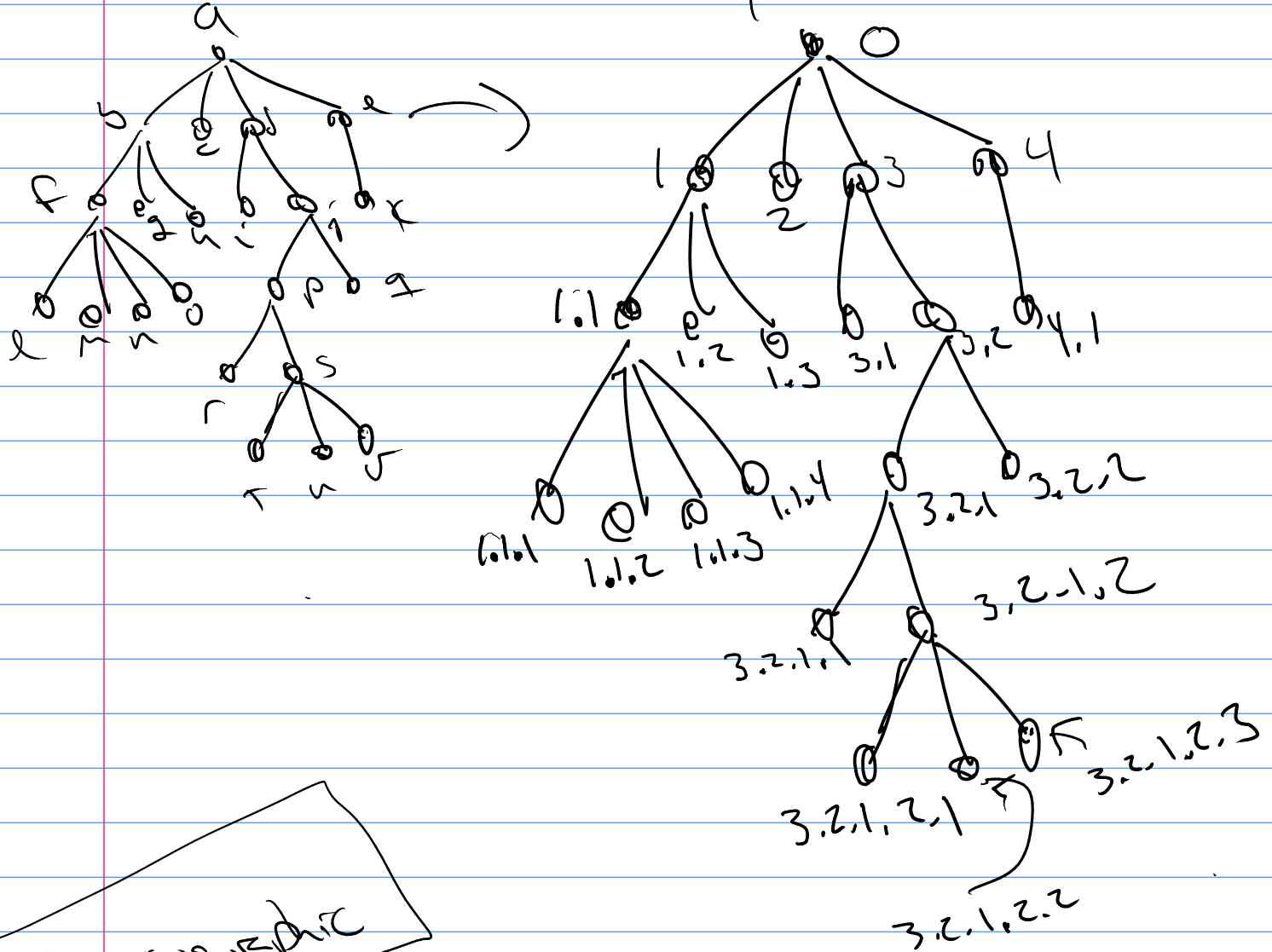
10.2(4) palmistry

palmistry

π_3 comparisons

10.3 Tree Traversal.

Universal Address System

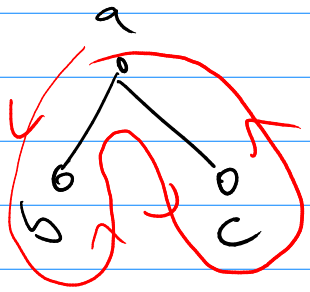


Lexicographic

$0 < 1 < 1.1 < 1.1.1 < 1.1.2 < 1.1.3 < 1.1.4 < 1.2 < \dots$

$0 < b < f < l < m < n < o < g < \dots$

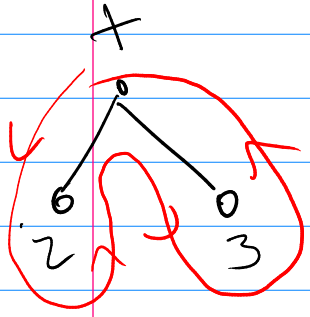
Traversals Preorder, Inorder, postorder.



preorder: a, b, c

Inorder: b, a, c

postorder: b, c, a



preorder: +, 2, 3 ← prefix

Inorder: 2, +, 3 ← infix

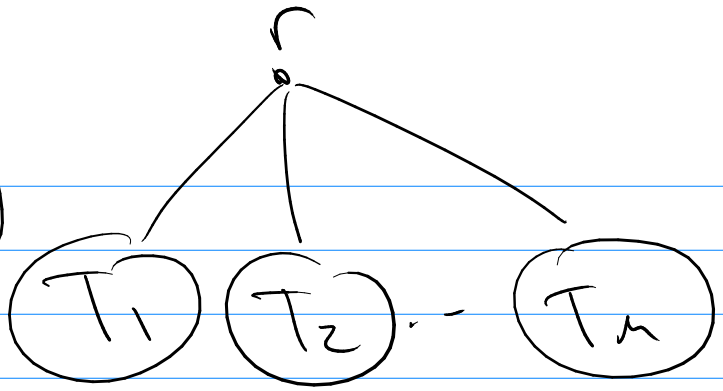
postorder: 2, 3, + ← postfix

Notation: polish notation (prefix)
(Jan Łukasiewicz)

reverse polish notation (postfix)

In General

(m-ary tree)

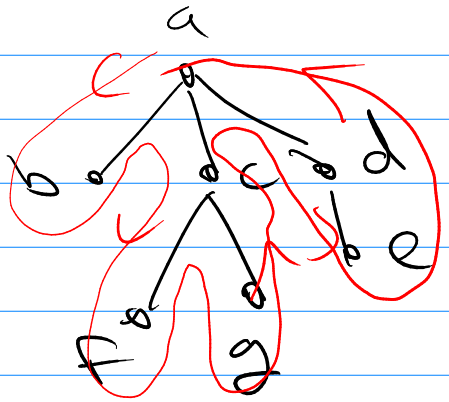


↑ subtree

preorder

1. Visit r
2. Visit T_1 in preorder
3. Visit T_2 in preorder
⋮
m+1. Visit T_m in preorder

ex



preorder traversal

a, b, c, f, g, d, e

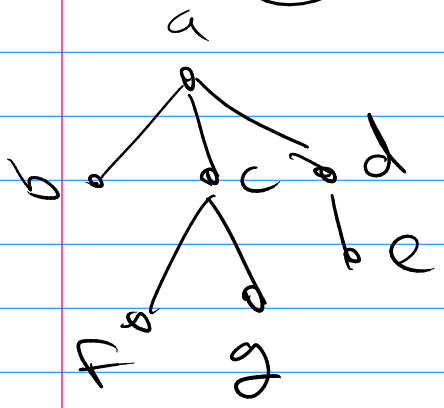
Inorder

1. Visit T_1 inorder
2. Visit r
3. Visit T_2 inorder
4. Visit T_3 inorder
⋮
m+1. Visit T_m inorder

▷ Inorder: b, a, f, c, g, e, d

Postorder Traversal

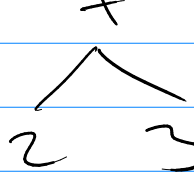
1. Visit T_1 postorder
2. Visit T_2 postorder
...
m. Visit T_m postorder
m+1. Visit r



Postorder

b, f, g, c, e, d, a

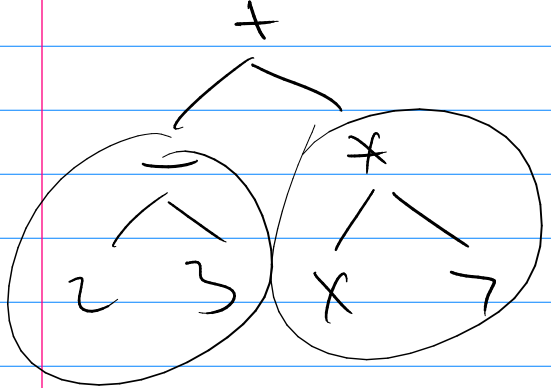
Expressions and Notation (traversals)



pre: +, 2, 3

In: 2, +, 3

Post: 2, 3, +



pre: +, -, 2, 3, *, x, 7

In: 2, -, 3, +, x, *, 7

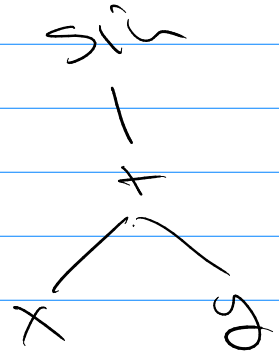
post: 2, 3, -, x, 7, *, +

pre: +, -, 2, 3, *, x, 7

In: (2, -, 3), +, (x, *, 7) ⇐

post: 2, 3, -, x, 7, *, +

sin(x+y) →



pre: sin, +, x, y

post: x, y, +, sin

In: x, +, y, sin ⇒ (x+y).sin