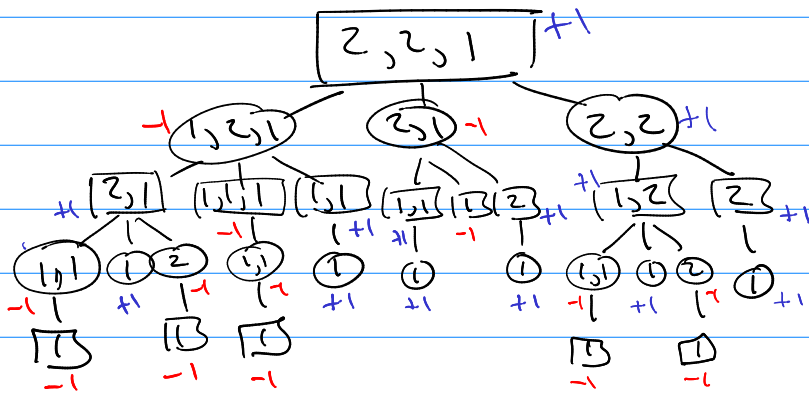
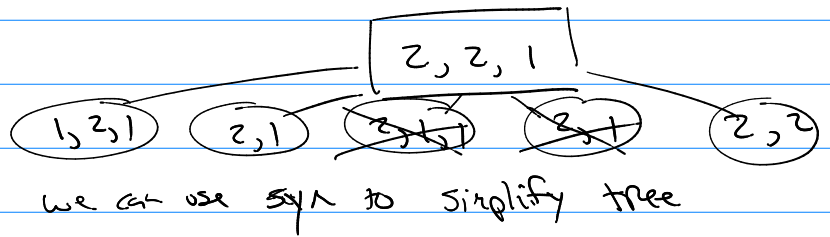


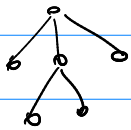
Math 322

Labelled Game Tree

Nim with 3 piles
 (1) take 1 or 2 from one pile
 (2) take last object(s) = lose



1.3 tree traversal

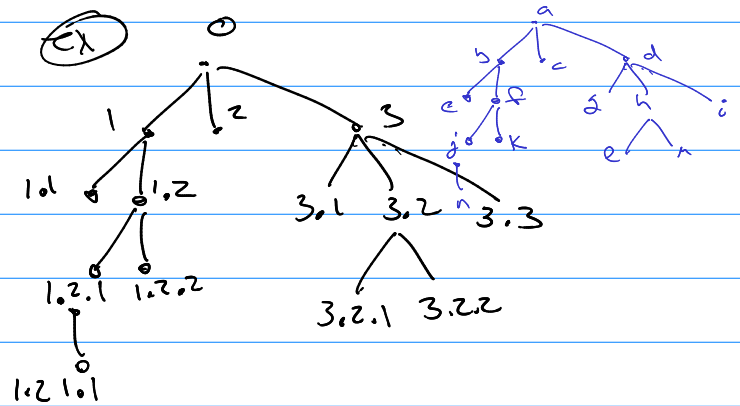


(1) given tree, $T = (V, E)$

(2) write V_i in linear chain.

(1) Universal Address System

- apply parent. ordered child
- write in lexicographic sort

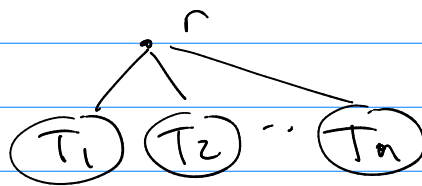


(ex) 0, 1, 1.1, 1.2, 1.2.1, 1.2.1.1, 1.2.2, 2, 3, 3.1, 3.2, 3.2.1, 3.2.2, 3.3

c) write vertex values

$a, b, e, f, j, n, k, c, d, g, h, l, m, i$

tree traversals (all inductive rules applied) to ..



$r \equiv \text{root}$
 T_i are subtree i

Pre-order traversal

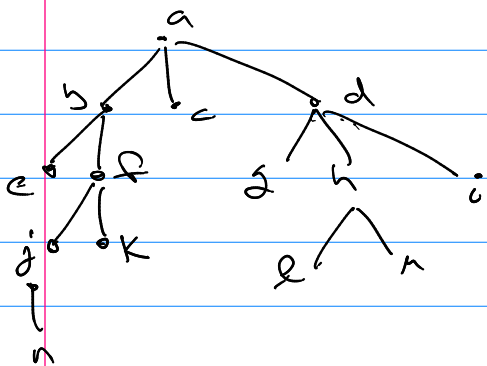
Step 1 visit r

Step 2 visit T_1 in pre-order

Step 3 visit T_2 in pre-order

:

Step $n+1$ visit T_n in pre-order



Pre-order: $a, b, e, f, j, k, c, d, g, h, l, m, i$

In-order: $e, b, j, k, f, a, c, g, d, l, h, m, i$

In-order Traversal

Step 1: visit T_1 in in-order

Step 2: visit r

Step 3: visit T_2 in in-order

:

Step $n+1$: visit T_n in in-order

Post-order traversal

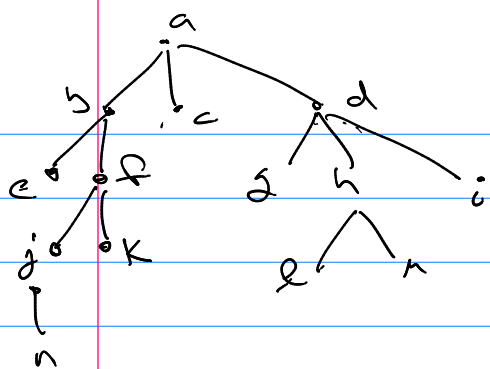
Step 1: visit T_1 in post-order

Step 2: visit T_2 in post-order

:

Step n : visit T_n in post-order

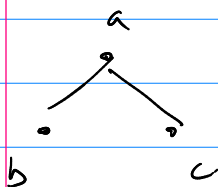
Step $n+1$: visit r



pre-order: a, b, e, f, j, n, k, c, d, g, h, l, m, i

in-order: e, b, n, j, f, k, a, c, g, d, l, h, m, i

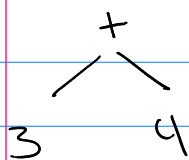
post-order: e, n, j, k, f, b, c, g, l, m, h, i, d, a



pre-order: a, b, c

in-order: b, a, c

post-order: b, c, a



pre-order: +, 3, 4

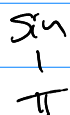
in-order: 3, +, 4

post-order: 3, 4, +

pre-fix notation

in-fix notation

post-fix notation



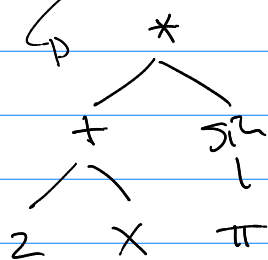
pre-order: sin, pi

in-order: pi, sin

post-order: pi, sin

book notation:

$$(2 + X) * \sin(\pi)$$



pre-fix: *, +, 2, X, sin, pi

in-fix: 2, +, X, *, pi, sin

post-fix: 2, X, +, pi, sin, *

Problems with in-fix: 2 + X * pi sin

without grouping symbols we can not know sub-trees

for math use grouping around sub trees $(2 + X) * (\pi \sin)$

Pre-fix, Post-fix do not need grouping.

Pre-fix: $*$, $+$, z , x , \sin , π

In fix: $(z, +, x) *$, (π, \sin)

Post-fix: $z, x, +, \pi, \sin, *$
