Math 322

Q's

12a) $x+y+z$

13a) $\boxed{\overline{x+y+z}}$

#13 $\{+, \bar{\ }\}$

$x \circ y = \overline{\bar{x}+\bar{y}}$

13b) $x+\overline{(y\circ(\bar{x}+z))}$

$= x+\overline{(\bar{y}+\overline{(\bar{x}+z)})}$

$\boxed{y} \circ \triangle = \overline{\bar{\triangle} + \bar{\triangle}}$, where $\triangle = \bar{x}+z$

Exam 3 (12 probs + 1 extra credit)

ch10 (Trees 8 probs)

10.1 (Intro)

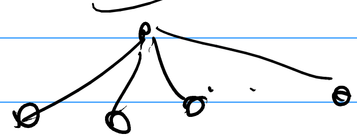
① Prove thm 5 p692

thm: m-ary tree of height h

$l \le m^h$

(Inductive Proof)

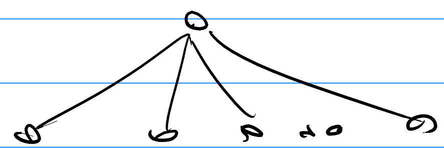
Proof: Basis: height 1 (m-ary)



$l \le m^1$ true.

Inductive:

assume P(K) show P(K+1)



$S_1 \leftarrow$ height K (finish)

② "chain letter" type

Know: Thm 2, 3, 4, 5

(+) corollary 1

$h \geq \lceil \log_m l \rceil \Leftrightarrow l \leq m^h$

Full, 13-ary tree ... 12 towards = h
and balanced

$\rightarrow l = 13^{12}$

10.2 Apps

① Decision Tree

typical coin problem

ex) 8 coins, 1 may be fake, don't know if heavy or light.

→ total outcomes: 1L, 1H, ..., 8H, None

17 outcomes = 17 leaves

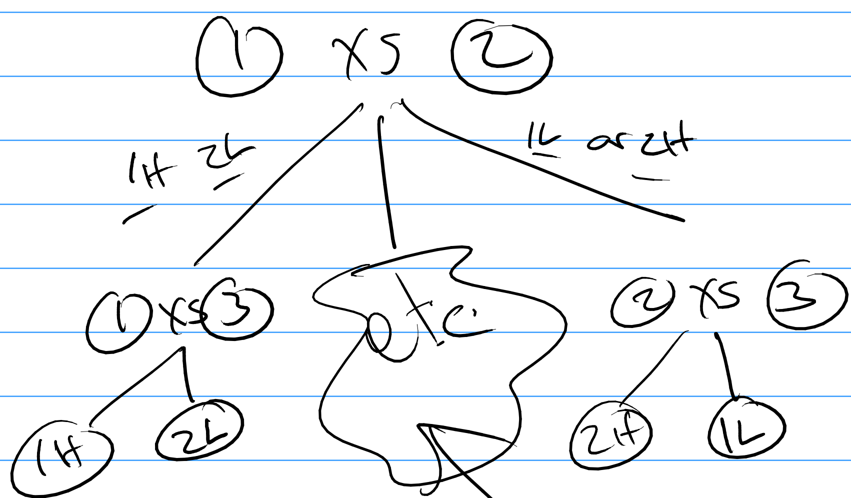
by $\boxed{\text{Cor. 1}}$ $h \geq \lceil \log_m \ell \rceil$

and a scale gives 3 results. (3 = m)

$h \geq \lceil \log_3 17 \rceil = 3$

So by 3 uses of scale may give all decisions.

Now: shoot for 3 with a tree.



Finish!

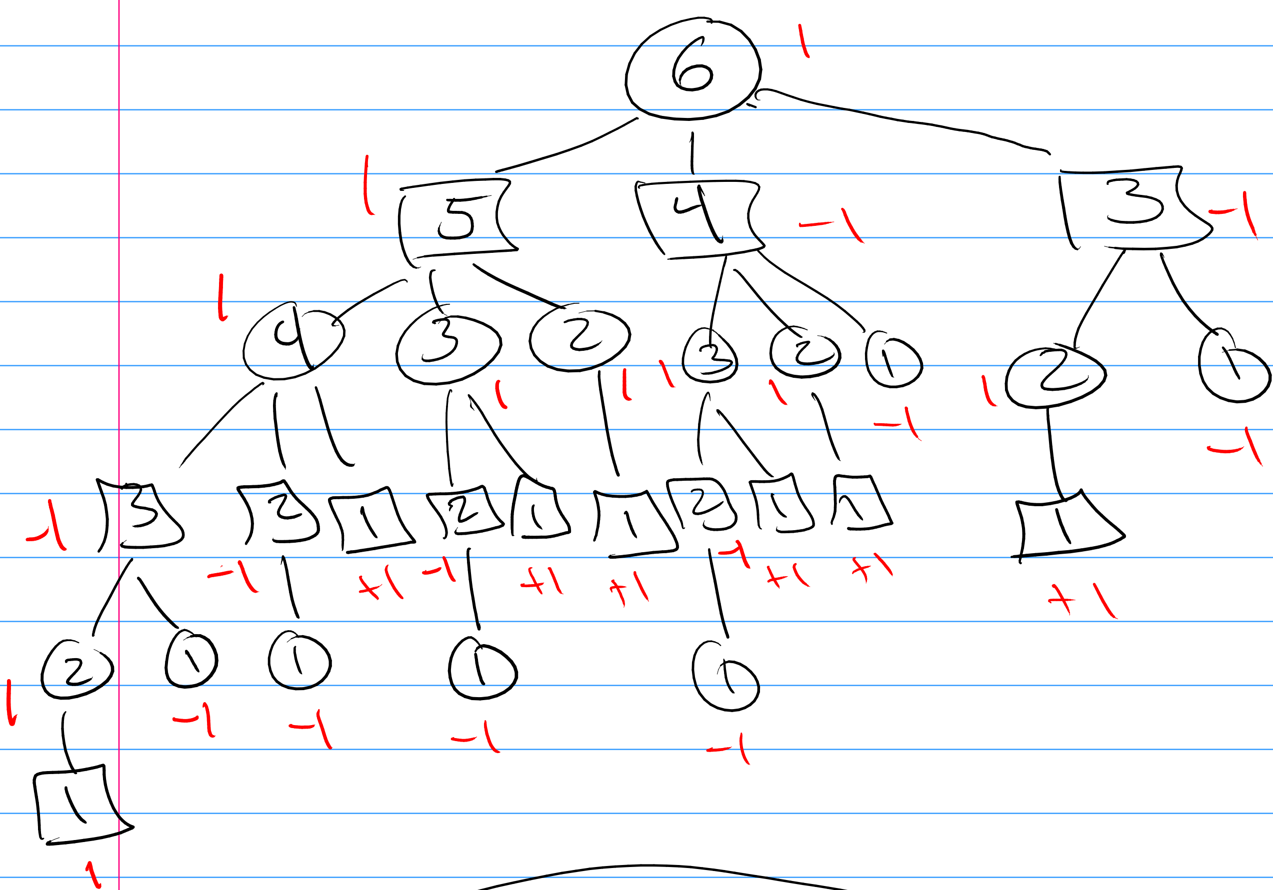
② Huffman Code

a: 10% b: 30% .... e: 5%

③ Game Tree (Nim)

Ex one pile, take 1 to 3 stones.

Start with 6 stones



10.3 Traversal

① Universal Address System

② pre-post-in-fix (+) Tree

③ fully parathesize a string

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ch 11 (4 probs)

11.1-2 Boolean Algebra

① Table for $f: B^n \to B$

② Verify a law using a table

③ Sum-of-Products ← minterms (products)

x	y	f	minterms
1	1	0	
1	0	1	$x\bar{y}$
0	1	0	
0	0	1	$\bar{x}\bar{y}$

Focus on 1's

$f(x,y) = x\bar{y} + \bar{x}\bar{y}$

④ Product-of-sums ← maxterms (sums)

x	y	f	maxterms
1	1	0	$\bar{x} + \bar{y}$
1	0	1	
0	1	0	$x + \bar{y}$
0	0	1	

Focus on 0's

$f(x,y) = (\bar{x} + \bar{y}) \cdot (x + \bar{y})$

Minterms.

$$f(x,y) = \overline{y} \cdot 1$$

$$= \overline{y} \cdot (x + \overline{x})$$

$$= \overline{y} \cdot x + \overline{y}\,\overline{x}$$

Maxterms

$$f(x,y) = \overline{y} + 0$$

$$= \overline{y} + (x \cdot \overline{x})$$

$$= (\overline{y} + x) \cdot (\overline{y} + \overline{x})$$

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extra credit

I'll pick one or two of..

p. 757 (35-39)