CS 173, Fall 2016 Examlet 9, Part	
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Discussion: Thursday 2 3 4 5 Friday 9 10 11 12 1 2

(18 points) If T is a binary tree with root R, then Heft(T) is defined to be

- 0 if R is a leaf
- m if R has one child subtree T', with Heft(T') equal to m
- 1+m if R has two child subtrees V and W, with Heft(V) and Heft(W) both equal to m
- otherwise, the maximum Heft of R's two child subtrees.

Use (strong) induction to prove that a binary tree T with Heft(T)=p has at least 2^p leaves The induction variable is named _____ and it is the _____ of/in the tree.

Base Case(s):

Inductive Hypothesis [Be specific, don't just refer to "the claim"]:

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Discussion	: Thursday	2	3	4	5	Friday	9 10	11	12	1	2
Happy tree is a fu by at most one. I	tecall that a node in all binary tree such the Prove that every Hamber. (Recall: $F_0 =$	the tv	wo chi tree c	ild su of heig	$\begin{array}{c} \text{btree} \\ \text{ght } h \end{array}$	s of each in	ternal nod	e have	height	ts tha	at differ
The induction	variable is named _		_ and	l it is	the _			of/in t	the tree	э.	
Base Case(s)):										
Inductive Hy	ypothesis [Be spe	cific	, don	't ju	st re	fer to "the	e claim"]:	:			
Inductive St	en:										

FIRST: Discussion: T (18 points) A Strang belled with natural num • Leaf nodes have lad • The label on an inf Use (strong) inductions the height of the tree	umbers such that the laternal node is on to prove the	ary tr hat s the	ree (i.	e. no of the	5 des h	ave bet	s child	ren, plu	is one.			
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 Delled with natural num Leaf nodes have lable The label on an interpretation Use (strong) induction 	umbers such that the laternal node is on to prove the	hat s the	sum (of the	e labe	els on it	s child	ren, plu	is one.			
Use (strong) induction	on to prove th									$(\frac{1}{2}(3^{h+}))$	$^{1}-1)$) wh
		at th	ie roo	t nod	le of a	any Stra	ange tr	ee has l	label ≤	$(\frac{1}{2}(3^{h+}))$	$(1-1)^{1}$) wh
						J				2		
The induction variab	ole is named $_$		_ and	l it is	the _				of/in t	the tree	Э.	
Base Case(s):												
Inductive Hypothe	esis [Be spec	cific,	don	't jus	st re	fer to	"the c	laim"]	:			

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Discussion: Thursday 2 3 4 5 Friday 9 10 11 12 1 2

(18 points) Let's define a Spooky Tree to be a binary tree containing 2D points such that:

- Each leaf node contains (1, 2), (5, 7), or (-1, 10).
- An internal node with one child labelled (a, b) has label (a, b + 1).
- An internal node with two childen labelled (x,y) and (a,b) has label $(\frac{x+a}{2}, \frac{y+b}{2})$.

Use (strong) induction to prove that the point in the root node of any Spooky tree is above the line x = y

The induction variable is named _____ and it is the _____ of/in the tree.

Base Case(s):

Inductive Hypothesis [Be specific, don't just refer to "the claim"]:

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Discussion:	Thursday	2	3	4	5	Friday	9 10	11	12	1	2
(18 points) Recal Peaceful tree is a full by at most one. Prove k th Fibonacci number	binary tree such e that every Pea	the taceful	two ch	hild su of he	ibtre ight <i>i</i>	es of each ir	nternal noo	de have	heigh	ts tha	at diffe
The induction vari	iable is named $_{-}$		_ and	d it is	the.			of/in t	the tre	e.	
Base Case(s):											
Inductive Hypot	thesis [Be spe	cific	, don	ı't jus	st re	fer to "th	e claim"]	:			
Inductive Sten											

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(18 points) Here	is a grammar G ,	with	ı star	t sym	bol S	and termi	nal s	ymbo	ls a an	d p.		
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				, ,	- '							
Use (strong) indunber of nodes with	-					0 (٠,	_		has a	n e
The induction var	riable is named _	. ,	_ and	l it is	the _				of/in t	he tree	<u>)</u> .	
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