CS 161 HW5

D PATQ: 7PVTQ

BATP: TRVTP

	PQ	P=>-Q	@77P	let of be P=>7Q and
0	TT	X	X	Bbe Q=>7P. Because
1	TF	1	1	$M(d) = M(B) = \{1,2,3\},$
2	FF		V	the two sentences are
3	FT		$\sqrt{}$	equivalent.
	-			V

P670: P=70: 7PV70: (7PV70) 1 (QVP)

		IP	Q	PATQ	((PATO) V(7PAQ))	
	0	T	T	X	X	
-	1	T	F	1	$\sqrt{}$	
	2	1	F	X	X	
	3	F	T	V		
		1				

let d be PETR and B be ((PATR)V(-PAR)).
Because M(d)=M(B)= {1,33, the two sentences
are equivalent.

a. 1(Smoke > fire) V (75moke > 7fire)
7 (75moke V fire) V (5moke V 7fire)
(5moke / 7fire) V (5moke V 7fire)

	Smoke	fire	(Smake > fire) > (75moke > 7fire)
O	丁	T	V
1	T	F	
2	F	T	X
3	F	F	
	1		

Because the set of worlds that the sentence is valid in is not all possible merlds, but not no worlds either, the sentence is neither falid nor unsat.

b. 7 (Smoke > fire) V ((Smoke V heat) > fire)
7 (7 Smoke V fire) V (7 (Smoke V heat) V fire)
(Smoke 17 fire) V ((7 Smoke 1 Theat) V fire)

	Smoke fire heat	(Smoke > fire) > ((Smoke v heat) > fire)
O	1777	A CONTRACTOR OF THE CONTRACTOR
1	TTF	4
2	TFT	
3	TFF	
4	FTT	1
5	FTF	
6	FFT	X
Π	FFF	

Because the set of worlds that the Sentence is valid in is not all possible worlds, but not empty the Sentence is neither valid nor unsat.

LHS: (Smoke / heat) > fire 7 (Smoke / heat) Vfire RHS: ((Smoke > fire) V (heat > fire)) ((75moke V fire) V (7heat V fire))

7(Smoke , heat) / fire) ((7Smoke V fire) V (7 heat V fire))

7 (7(Smoke 1 heat) V fire) V ((7Smoke V fire) V (Theat Ufire))

(Smoke 17 fire) V (75moke Vfire V7heat)

(75moke Vfire V7heat) > 7(5moke) heat) Vfire

7 (75moke Vfire V Theat) V(1(smoke 1 heat) Vfire)

(7 (75moke V fire) 1 heat) V (75moke V Theat V fire)

(Smoke 17 fire / heat) V7 Smoke V7 heat Vfire

(Smoke / Tfire) V (7 Smoke V fire V Theat)] 1 (Smoke 17 the Meat) V7 Smoke V7 heat V fire]

	Smoke	-Cina	bart	Gentence
0	T	T	T	Variable
1	T	T	F	
2	T	F	T	1
3	T	F	F	\
4	F	T	T	
5	F	T	F	
6	F	F	T	
7	F	F	F	$\sqrt{}$
	ľ			i i

Because the set of all worlds the sentence is valid in is all possible worlds, the Sentence is valid.

△= { mythical > 7 mortal, 7 mythical > mortal / mammal) 7 mortal V mammal > harned, harned > magical } mythical:a (Tavab) A (av (bAc)) A (7(7bvc) vd) A 6. matal: b 7dve) nammoll: C (7aV7b) A ((aVb) A (aVc)) A ((bA7c) Vd) A homed:d magical: e (7d Ve) (7a V7b) ~ (avb) ~ (avc) ~ (bvd) ~ (rcvd), (7dve) O) Javyb \$ 15 CNF from port b 1) avb d is a 1=£ ? 2) avc ON 700 unsat? byd 4) ncval mythical 5) 7dve No more rules can be 372 applied, and no contradictors 70 have been found. Thus, 1,6 ANTH IS SAT, and A C 2,6 cannot be used-to prove d 4,8 the unicom is mighical. 0 5,9 dise 3)7aV7b 7 and 11 contradict. 7d 5,6 1) avb TC 7d Ad never true, so 47 △ 170C Is unsA+ and 2) avc a 2,8 3) byd al=a. Thus, we can dr (01 0,9 use so to prove the a) TCVd 3,10 5) -due unicorn is magical. 372 5) 7e

c. continued disd 6 and 10 contradict, 3,6 0) 7a V7b 8) 7a 0,7 SO DATOLIS unset) avb C 2,8 and w/= a. Thus, 2) avc 10) d 4,9 bvd we can use a to prove the milan TCVd is homed. 5) 7dve 6) 7d 370

C . . . 4) Figure D decomposable: yes, vars on each side of AND gates are different determinism: ho top or gate inputs over+ mut, excl. (A= true) (JANB)V (JBNA): V B=false, (c) V (7017C): 1 C=true, 3 (7A 17B) V (A):√ D=false) (crno) V (orac) B ONO V3AB smooth: No, with @ mats on rightside arent all present on RHS (D). Figure 2) decomposable: yes, was in each side of AND, are diff. determinism: ho, or gate () is some on each side (A= false, ((JANB) V (JANB) :X B=twe 2 (c/D) V(7017c) leads to both sides 3 (TANB) V (TANB) (CCATO) V(DATC) being the (5) (DADVB) A (9) smooth; ges, in each or gate, O-B, all vars present in either side are also pres, on other side. MXOR 5 (JAAB) V(JBAA) WMC = W(A,7B)+W(7A,B) = W(A)-W(7B)+W(7A)·W(B) TT TF = 0.1.0.7+0.9.0.3 FT = 0.34 FF

b. The count on the root is some as the work for the formula.
The same calculations are performed.

