5) My final equation from 4 is $(p \vee q) \wedge (p \vee \sim r \vee (s \wedge \sim t))$

in the case where p and q are both false, the overall equation is false.

if p is true, both sides of the and are satisfied and it's true overall

because there is a true and false case, it's satisfiable

4) $p \vee (q \wedge \sim(r \wedge (s \to t)))$ $\quad (p$

$(\sim p \vee q)$

$\sim(r \wedge (\sim p \vee q))$

$p \vee (q \wedge (\sim r) \vee (\sim(\sim p \vee q)))$

$p \wedge \sim q$

$p \vee (q \wedge (\sim r \vee p \wedge \sim q))$

$(p \vee q) \wedge (p \vee \sim r \vee s \wedge \sim q)$

$p \vee (q \wedge \sim(r \wedge (s \to t)))$

cond

$p \vee (q \wedge \sim(r \wedge (\sim s \vee t)))$ $\xrightarrow{\text{demorg}}$ $p \vee (q \wedge (\sim r) \vee (\sim(\sim s \vee t)))$

dist $\quad$ demorg

$p \vee (q \wedge \sim((r \wedge \sim s) \vee (r \wedge t)))$ $\quad p \vee (q \wedge (\sim r) \vee ((s) \wedge (\sim t)))$

parens

$p \vee (q \wedge \sim(r \wedge \sim s) \wedge \sim(r \wedge t))$ $\quad p \vee (q \wedge (\sim r \vee (s \wedge \sim t)))$

dist

$p \vee (q \wedge \sim r \vee s \wedge \sim r \vee \sim t)$ $\quad (p \vee q) \wedge (p \vee (\sim r \vee (s \wedge \sim t)))$

parens

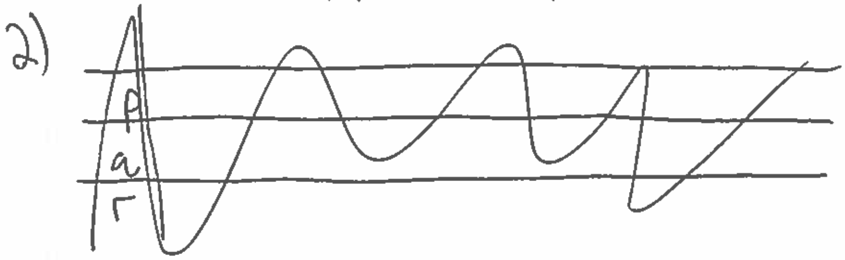
$(\underset{x}{p \vee q}) \wedge (p \vee (\underset{y}{\sim r \vee s} \wedge \underset{z}{\sim r \vee \sim t}))$ $\quad (p \vee q) \wedge (p \vee \sim r \vee (s \wedge \sim t))$

$\to$

$(\cancel{p \vee q}) \wedge (p \vee \sim r$

HW 11

2)



p	q	r	p→q	p→r	q∧r	p→q∧r	
T	T	T	T	T	T	T	0
T	T	F	T	F	F	F	X
T	F	F	F	F	F	F	X
T	F	T	F	T	F	F	X
F	T	T	T	T	T	T	0
F	T	F	T	T	F	T	0
F	F	T	T	T	F	T	0
F	F	F	T	T	F	T	0

x

3) 1. tautology
2. tautology
3. satisfiable
4. contra

~~p+q false → all good~~

when is left true?
p+q false → satisfies
all true → satisfies
f → f

and
(p or q or r) T T TFF
(Not p) or (not q) or (not r) TFF
(p or (not q)) TFF TFT
(q or (not r)) TFF true w/ r t or p f
(r or (not p)) TFF

p/q
q/r
r/p

HW11

$(\sim p \vee q)$ need this to be $q \wedge r$ $(\sim p \vee r)$

$(\sim p \vee (q \wedge r))$

$\cancel{\sim qq} \longrightarrow (\sim p \vee q) \wedge (\sim p \vee r)$

q
r
$r \wedge q$

1) assume $p \to q$
2) assume $p \to r$
3) $(\sim p \vee q)$ conditional, #1
4) $(\sim p \vee r)$ conditional, #2
5) $(\sim p \vee q) \wedge (\sim p \vee r)$ conjunction, #3, #4
6) $(\sim p \vee (q \wedge r))$ distributive, #5
7) $p \to (q \wedge r)$ conditional, #6

1) assume $p \to (q \vee r)$
2) assume $p \to (q \vee \sim r)$
3) problem #1 here
4) $p \to (q \vee r) \wedge (q \vee \sim r)$
5) $p \to q \vee (r \wedge \sim r)$ dist, #5
6) $p \to q \vee F$ #5, negation
7) $p \to q$ #6, identity

$(r \vee \sim r) = T$

$q \vee F = q$

$F = r \wedge \sim r$

$p \to (q \vee r) \wedge (q \vee \sim r)$

dist $\to \vee$

$q \vee (r \wedge \sim r)$