Julia Nelson CS-135 Problem Set 2 2/4/18

"I pledge my honor that I have abided by the Stevens Honor System." J Nelson

Problem 1:

a) $\forall d \, \exists y \; \text{Fool}(\text{Lem}, y, d)$

b) $\exists x \exists y \forall d \; \text{Fool}(x, y, d) \wedge (y \equiv \neg x)$

c) $\forall x \, \exists y \, \exists d \; \text{Fool}(x, y, d)$

d) $\forall d \, \forall x \, \forall y \, \forall z \, \text{Fool}(x, y, d) \rightarrow \neg \text{Fool}(y, z, d)$

e) $\forall d \; \neg \text{Fool}(\text{Lem}, \text{Lem}, d)$

f) $\forall x \, \forall d \; \text{Wise}(x) \rightarrow \neg \text{Fools}(x, x, d)$

g) $\forall x \, \exists d \, \forall y \; \text{Wise}(x) \wedge \text{Fools}(\text{Lem}, x, d) \rightarrow \neg \text{Fool}(\text{Lem}, x, d) \wedge \text{Future}(d, y)$

h) $\exists x \, \exists d \, \exists y \, \text{Fools}(x, \text{Lem}, d) \rightarrow \text{Fools}(\text{Lem}, \text{Lem}, y) \wedge \text{Futrue}(y, d)$

i) $\forall x \, \exists y \, \exists d \; \text{Fools}(y, x, d) \wedge \text{Fools}(y, x, z) \wedge \text{Future}(d, z) \rightarrow \neg \text{Wise}(x)$

j) $\exists x \, \exists z \, \exists d \, \exists y \; \text{Fool}(x, \text{Lem}, d) \wedge \text{Fools}(z, \text{Lem}, y) \wedge \neg(\text{Lem} \equiv x) \wedge \neg(\text{Lem} \equiv z) \wedge \neg(d \equiv y)$

Problem 2

a) $a+b+c$ in terms of S_0 and S_1 $0=F$ $1=T$

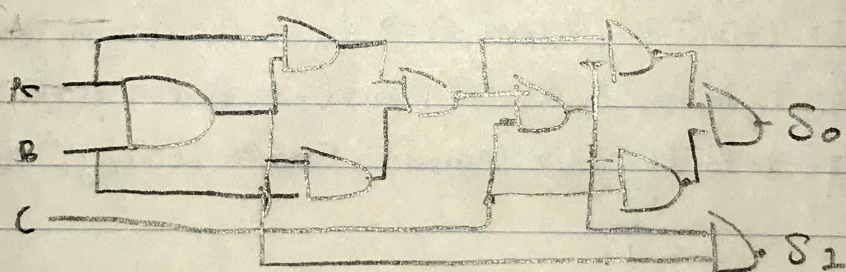
a	b	c	S_0	S_1
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

b) $S_0 = (a \wedge b \wedge c) \vee (a \wedge \neg b \wedge \neg c) \vee (\neg a \wedge b \wedge \neg c) \vee (\neg a \wedge \neg b \wedge c)$

$S_1 = (a \wedge b \wedge c) \vee (\neg a \wedge b \wedge c) \vee (a \wedge \neg b \wedge c) \vee (a \wedge b \wedge \neg c)$

NAND gate connective (not sure if you wanted "↑")

c)



$S_0 = ((a \uparrow b \uparrow c) \uparrow (a \uparrow b \uparrow c)) \uparrow ((a \uparrow b \uparrow c) \uparrow (a \uparrow b \uparrow c))) \uparrow ((a \uparrow (b \uparrow b) \uparrow (c \uparrow c)) \uparrow (a \uparrow (b \uparrow b)$ ~

~ $\uparrow (c \uparrow c)) \uparrow ((a \uparrow (b \uparrow b) \uparrow (c \uparrow c)) \uparrow (a \uparrow (b \uparrow b) \uparrow (c \uparrow c))) \uparrow (((a \uparrow a) \uparrow b \uparrow (c \uparrow c)) \uparrow ((a \uparrow a) \uparrow$

$b \uparrow (c \uparrow c))) \uparrow (((a \uparrow a) \uparrow (b \uparrow b) \uparrow c) \uparrow ((a \uparrow a) \uparrow (b \uparrow b) \uparrow c))$

$S_1 = ((a \uparrow b \uparrow c) \uparrow (a \uparrow b \uparrow c)) \uparrow ((a \uparrow b \uparrow c) \uparrow (a \uparrow b \uparrow c)) \uparrow (((a \uparrow a) \uparrow b \uparrow c) \uparrow ((a \uparrow a)$

$\uparrow b \uparrow c)) \uparrow ((a \uparrow (b \uparrow b) \uparrow c) \uparrow (a \uparrow (b \uparrow b) \uparrow c)) \uparrow (a \uparrow (b \uparrow b) \uparrow c) \uparrow (a (b \uparrow b) \uparrow c))$

$\uparrow (a \uparrow b \uparrow (c \uparrow c)) \uparrow (a \uparrow b \uparrow (c \uparrow c)) \uparrow (a \uparrow b \uparrow (c \uparrow c)) \uparrow (a \uparrow b \uparrow (c \uparrow c))$