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CSE-4321-002

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Homework 2

1.

Length	Sequence	Response	Equivalence	Carry to next level
0	Idle	M = "Ready", R = F, W = F	-	
1	C	M = "Ready", R = F, W = F	Idle	
1	S	M = "Ready", R = F, W = F	Idle	
1	T	M = "Ready", R = F, W = F	Idle	
1	Q	M = "1 Quarter deposited", R = F, W = F	-	Yes
2	QC	M = "Ready", R = T, W = F	Idle	
2	QT	M = "Ready", R = T, W = F	Idle	
2	QS	M = "1 Quarter deposited", R = F, W = F	Q	
2	QQ	M = "2 Quarters deposited", R = F, W = F	-	Yes
3	QQC	M = "Ready", R = T, W = F	Idle	
3	QQT	M = "Ready", R = T, W = F	Idle	
3	QQS	M = "2 Quarters deposited", R = F, W = F	QQ	
3	QQQ	M = "3 Quarters deposited", R = F, W = F	-	Yes
4	QQQC	M = "Ready", R = T, W = F	Idle	
4	QQQT	M = "3 Quarters deposited", R = F, W = F	QQQ	
4	QQQS	M = "Starting Wash", R = F, W = T	-	Yes
4	QQQQ	M = "3 Quarters deposited", R = F, W = F	QQQ	
5	QQQSC	M = "Starting Wash", R = F, W = T	QQQS	
5	QQQSS	M = "Starting Wash", R = F, W = T	QQQS	
5	QQQST	M = "Ready", R = F, W = F	Idle	
5	QQQSQ	M = "Starting Wash", R = F, W = T	QQQS	

Canonical states: Q, QQ, QQQ, QQQS, QQQST

Test Case Number	Current State	Inputs				Expected Outputs			Next State
		C	Q	S	T	M	R	W	
1	Start	-	-	-	-	"Ready"	F	F	S0
2	S0	T	-	-	-	"Ready"	F	F	S0
3	S0	-	T	-	-	"1 Quarter deposited"	F	F	S1
4	S0	-	-	T	-	"Ready"	F	F	S0
5	S0	-	-	-	T	"Ready"	F	F	S0
6	S1	T	-	-	-	"Ready"	T	F	S0
7	S1	-	T	-	-	"2 Quarters deposited"	F	F	S2
8	S1	-	-	T	-	"1 Quarter deposited"	F	F	S1
9	S1	-	-	-	T	"Ready"	T	F	S0
10	S2	T	-	-	-	"Ready"	T	F	S0
11	S2	-	T	-	-	"3 Quarters deposited"	F	F	S3
12	S2	-	-	T	-	"2 Quarters deposited"	F	F	S2
13	S2	-	-	-	T	"Ready"	T	F	S0
14	S3	T	-	-	-	"Ready"	T	F	S0
15	S3	-	T	-	-	"3 Quarters deposited"	F	F	S3
16	S3	-	-	T	-	"Starting Wash"	F	T	S4
17	S3	-	-	-	T	"Ready"	T	F	S0
18	S4	T	-	-	-	"Starting Wash"	F	T	S4
19	S4	-	T	-	-	"Starting Wash"	F	T	S4
20	S4	-	-	T	-	"Starting Wash"	F	T	S4
21	S4	-	-	-	T	"Ready"	F	F	S0

2.

Test Case Number	Inputs					Expected Output
	Fuel Level	Discount Type	Fuel Type	Special Purchases	Payment Type	Return
1	0.00	None	Unleaded	None	Cash	\$0.00
2	0.00	Student	Midrange	CarWash	CreditCard	\$5.41
3	0.00	Teacher	Premium	AirTires	DebitCard	\$1.62
4	14.28	None	Midrange	AirTires	Cash	\$31.76
5	14.28	Student	Unleaded	StoreDiscount	DebitCard	\$27.10
6	14.28	Teacher	Diesel	None	CreditCard	\$36.00
7	28.56	None	Premium	CarWash	CreditCard	\$77.38
8	28.56	Student	Diesel	AirTires	Cash	\$65.86
9	28.56	Teacher	Unleaded	CarWash	Cash	\$58.69
10	28.56	Military	Midrange	None	DebitCard	\$52.82
11	42.84	None	Diesel	StoreDiscount	DebitCard	\$111.45
12	42.84	Military	Unleaded	AirTires	CreditCard	\$77.55
13	42.84	Frequent	Premium	None	Cash	\$81.33
14	57.12	Military	E-85	CarWash	Cash	\$93.61
15	57.12	Frequent	Midrange	StoreDiscount	CreditCard	\$103.49
16	57.12	Employee	Premium	StoreDiscount	Cash	\$102.74
17	57.12	Student	E-85	None	DebitCard	\$96.27
18	71.40	Frequent	E-85	CarWash	DebitCard	\$112.38
19	71.40	Employee	Diesel	None	CreditCard	\$142.10
20	71.40	Teacher	E-85	StoreDiscount	Cash	\$124.30
21	85.68	Employee	E-85	AirTires	CreditCard	\$125.58
22	85.68	Military	Diesel	CarWash	DebitCard	\$193.04
23	85.68	Frequent	Unleaded	AirTires	Cash	\$136.21
24	100.00	Employee	Unleaded	CarWash	DebitCard	\$157.23
25	100.00	Military	Premium	StoreDiscount	CreditCard	\$215.27
26	100.00	None	E-85	AirTires	Cash	\$183.28
27	0.00	Frequent	Diesel	StoreDiscount	Cash	\$1.08
28	14.28	Employee	Midrange	CarWash	Cash	\$28.02
29	28.56	Student	Premium	StoreDiscount	CreditCard	\$65.85
30	42.84	Teacher	Midrange	CarWash	DebitCard	\$93.96
31	57.12	None	Unleaded	AirTires	CreditCard	\$120.72
32	71.40	None	Premium	AirTires	DebitCard	\$176.30
33	85.68	Student	Midrange	None	Cash	\$162.75
34	85.68	Teacher	Premium	StoreDiscount	CreditCard	\$206.19
35	100.00	Frequent	Midrange	None	CreditCard	\$179.29
36	0.00	Military	E-85	None	CreditCard	\$0.00
37	14.28	Military	Premium	None	DebitCard	\$29.70
38	14.28	Frequent	E-85	CarWash	CreditCard	\$27.45
39	28.56	Frequent	E-85	AirTires	DebitCard	\$44.41
40	42.84	Employee	E-85	StoreDiscount	DebitCard	\$61.25
41	57.12	Teacher	Diesel	AirTires	DebitCard	\$141.43
42	71.40	Military	Unleaded	StoreDiscount	Cash	\$120.25
43	71.40	Student	Midrange	AirTires	CreditCard	\$145.64
44	100.00	Student	Diesel	Dar	Cash	\$230.33
45	0.00	Employee	Unleaded	None	DebitCard	\$0.00
46	42.84	Student	Premium	CarWash	Cash	\$96.91
47	85.68	None	Midrange	StoreDiscount	DebitCard	\$187.51
48	100.00	Teacher	Unleaded	None	DebitCard	\$192.31
49	28.56	Employee	Diesel	None	CreditCard	\$56.84

3.

A) $a'b'd' + a'cd + ac'd + a'c'd$

cd	00	01	11	10
ab				
00	X	X	X	X
01		X	X	
11		X		
10		X		

Answer: $a'b' + a'd + c'd$

B) $a'b'c'd + ab'c'd + ab'cd + a'bcd + abc'd + abcd$

cd	00	01	11	10
ab				
00		X		
01			X	
11		X	X	
10		X	X	

Answer: $ad + bcd + b'c'd$

C) $a'b' + a'bc'd + ac'd$

	cd 00	01	11	10
ab 00	X	X	X	X
01		X		
11		X		
10		X		

Answer: $a'b' + c'd$

D) $abc'd + a'b'c'd + ab'c'd' + abc'd' + a'bc'd + ab'c'd + a'bc'd'$

	cd 00	01	11	10
ab 00		X		
01	X	X		
11	X	X		
10	X	X		

Answer: $bc' + ac' + c'd$

E) $a'b'c'd' + ab'c'd' + ab'cd' + a'bc'd' + abc'd' + a'b'c'd$

	cd 00	01	11	10
ab 00	X	X		
01				
11	X			
10	X			X

Answer: $a'b'c + ac'd' + ab'cd'$

4.

A) $a' + b'c$

	<u>a</u> <u>b</u> <u>c</u>	<u>a'</u> + <u>bc</u>	
	F F F	T	
	F F T	T	
	F T F	T	
	F T T	T	
	T F F	F	
	T F T	T	
	T T F	F	
	T T T	F	

C\D: (FFF, TTT)

C: (FTF, TFT)

D: (TFT, TTF)

TNF: $a + bc'$

TOF: $b'c$

B) $a(c' + d)$

	<u>a</u> <u>c</u> <u>d</u>	<u>a(c' + d)</u>
C\D	FFF	F
	FFT	F
	FTF	F
	FTT	F
	TFF	T
	TFT	T
	TTF	F
	TTT	T
		C

C\D: (FFF, TTT)

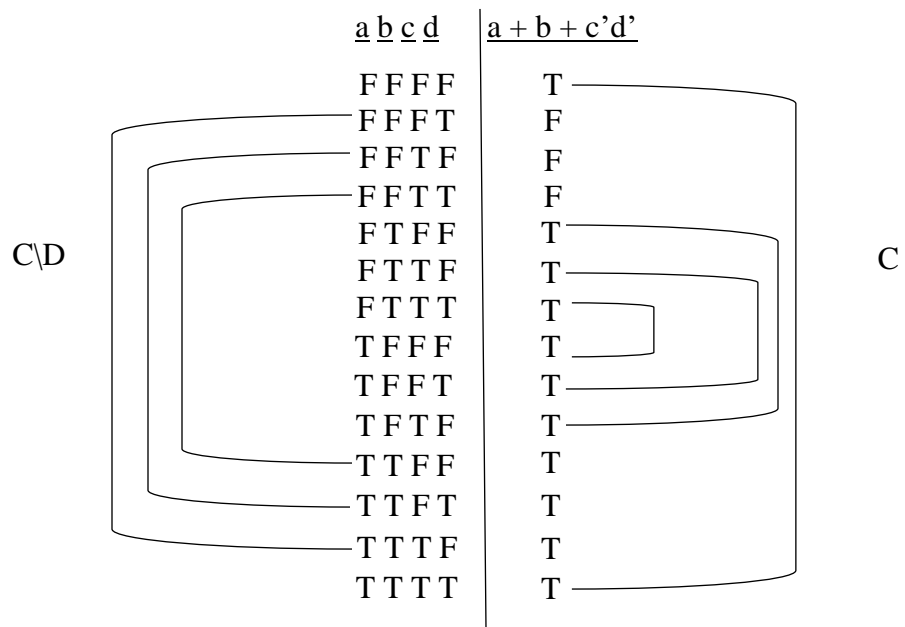
C: (FFT, TTF)

D: (TFT, TTF)

TNF: $a(c + d')$

TOF: ac'

C) $a + b + c'd'$



C\D: (FFFT, TTTF)

C: (FFFF, TTTT)

D: (FFFF, FFFT)

TNF: $a + b + cd$

TOF: $a + b$

D) $(a'b' \text{ XOR } cd) + a'b'cd$

	<u>a</u> <u>b</u> <u>c</u> <u>d</u>	<u>a + b + c'd</u>	
	FFFF	T	
	FFFT	T	
	FFTF	T	
	FFTT	T	
	FTFF	F	
	FTTF	F	
	FTTT	T	
	TFFF	F	
	TFFT	F	
	TFTF	F	
	TTFF	F	
	TTFT	F	
	TTTF	F	
	TTTT	T	

C\D: (FFFT, TTTF)

C: (FFFF, TTTT)

D: (FFTT, FTFF)

TNF: $(a'b' \text{ XOR } cd) + abc'd'$

TOF: $a'b'cd$

5.

1)

A)

	Inputs		Expected Outputs
Test Case	b	c	a
1	10	F	T
2	9	F	F
3	9	T	T

B)

	Inputs		Expected Outputs
Test Case	b	c	a
1	T	5	T
2	F	5	F
3	F	4	T

C)

	Inputs		Expected Outputs
Test Case	b	c	a
1	6	8	F
2	6	7	T
3	5	7	F

D)

	Inputs		Expected Outputs
Test Case	b	c	a
1	0	-	F
2	10	-	T
3	11	-	F

2)

A) $a'b' + c'$

COI	a	XFT	}	FFT, TFT, FTT
	b	FXT		
	c	FTX, TFX, TTX		

UC: FFT, TFT, FTT, TTF

B) $a(c'+d)$

COI	a	XFT	}	TFT, TTT, TFF
	c	TXT		
	d	TFX		

UC: TFT, TTT, TFF, FFT


C) $a + b + c'd'$

COI	a	XFTT, XFTE, XFFT	}	FFTE, FFFF, FFFT
	b	FXTT, FXTE, FXFT		
	c	FFXF		
	c	FFFX		

UC: FFTE, FFFF, FFFT, TFFT, FTFT

3)

$$\mathbf{ab' + c + d}$$

COI	a	XFFF		FFFF, TFFF, TTFF
	b	TXFF		
	c	FFXF, FTXF, FFXF, TTXF		
	d	FFFX, FTFX, FFFX, TTFX		

UC1: FFFF, TFFF, TTFF, FTTF, FFFT

UC2: FFFF, TFFF, TTFF, FTTF, FTFT

M: FFFF, TFFF, TTFF, TTTF, FTFF