Logic Specification Programming - Sheet #5

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Exercise 15

a)
Constraints:
Y - X $\geq 3 \rightarrow ((X, Y), \{(3,6), (2,5), (2,6), (1,6), (1,5), (1,4), (0,3), (0,4), (0,5), (0,6)\})$
$X mod Z = 0 \rightarrow ((X, Z), \{(0,2), (0,4), (0,6), (2,2), (4,4), (6,6), (6,2), (4,2)\})$
$Z = Y - 2 \rightarrow ((Z, Y), \{(4,6), (2,4), (0,2)\})$

b)

iteration	arc	workpool	domain changes
initial	-	(X,Y),(Y,X),(X,Z),(Z,X),(Z,Y),(Y,Z)	-
1	(X,Y)	(Y,X),(X,Z),(Z,X),(Z,Y),(Y,Z)	$D_x = \{0,1,2,3\}$
2	(Y,X)	(X,Z),(Z,X),(Z,Y),(Y,Z)	$D_y = \{3,4,5,6\}$
3	(X,Z)	(Z,X),(Z,Y),(Y,Z),(X,Y),(Y,X)	$D_x = \{0,2\}$
4	(Z,X)	(Z,Y),(Y,Z),(X,Y),(Y,X)	$D_z = \{2,4,6\}$
5	(Z,Y)	(Y,Z),(X,Y),(Y,X),(X,Z),(Z,X)	$D_z = \{2,4\}$
6	(Y,Z)	(X,Y),(Y,X),(X,Z),(Z,X)	$D_y = \{4,6\}$
7	(X,Y)	(Y,X),(X,Z),(Z,X)	-
8	(Y,X)	(X,Z),(Z,X)	-
9	(X,Z)	(Z,X)	-
10	(Z,X)	$\emptyset$	-

Possible solutions:
X=0, Z=2, Y= 4
X=0, Z=4, Y=6

Exercise 16

a)
$F = (A \vee \neg B \vee \neg C) \wedge (\neg A \vee C) \wedge (A \vee D) \wedge (B \vee \neg C \vee \neg D) \wedge C \wedge (C \vee D) \wedge (\neg A \vee D)$

Choose C equals true (Unit propagation)
$F = (A \vee \neg B) \wedge (A \vee D) \wedge (B \vee \neg D) \wedge (\neg A \vee D)$

Choose Literal A for Recursive Call (A equals true)
$F = A \wedge (A \vee \neg B) \wedge (A \vee D) \wedge (B \vee \neg D) \wedge (\neg A \vee D)$
$F = (B \vee \neg D) \wedge D$

Choose D equals true (Unit propagation)
$F = B$

Choose B equals true (Unit propagation)
$F = true$

F is satisfiable with A = true, B= true, C = true, D=true

b)
$G = (\neg X \vee \neg Y \vee \neg Z) \wedge (\neg X \vee Y \vee Z) \wedge (\neg X \vee Y \vee \neg Z) \wedge (X \vee Y \vee Z) \wedge (X \vee \neg Y \vee Z) \wedge (\neg X \vee \neg Y \vee Z) \wedge (X \vee \neg Y \vee \neg Z)$

Choose Literal X for Recursive Call (X equals false)
$G = \neg X \wedge (\neg X \vee \neg Y \vee \neg Z) \wedge (\neg X \vee Y \vee Z) \wedge (\neg X \vee Y \vee \neg Z) \wedge (X \vee Y \vee Z) \wedge (X \vee \neg Y \vee Z) \wedge (\neg X \vee \neg Y \vee Z) \wedge (X \vee \neg Y \vee \neg Z)$
$G = (Y \vee Z) \wedge (\neg Y \vee Z) \wedge (\neg Y \vee \neg Z)$

Choose Literal Y for Recursive Call (Y equals false)
$G = \neg Y \wedge (Y \vee Z) \wedge (\neg Y \vee Z) \wedge (\neg Y \vee \neg Z)\ G = Z$

Choose Z equals true (Unit propagation)
$F = true$

F is satisfiable with X=false, Y=false, Z=true