Homework3

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6.5

分别用带有前向检验、MRV和最少约束值启发式的回溯算法手工求解图6.2中的密码算数问题。

$O+O=R+10X_1$
$X_1+2W=U+10X_2$
$X_2+2W=U+10X_3$
$X_3=F$

	X_3	X_2	X_1	F	T	W	O	U	R
初始域	{0,1}	{0,1}	{0,1}	{0,1,...,9}	{0,1,...,9}	{0,1,...,9}	{0,1,...,9}	{0,1,...,9}	{0,1,...,9}
After $X_3=1$	1	{0,1}	{0,1}	1	{0,1,...,9}	{0,1,...,9}	{0,1,...,9}	{0,1,...,9}	{0,1,...,9}
After $F=1$	1	{0,1}	{0,1}	1	{5,...,9}	{0,2,...,9}	{0,2,...,9}	{0,2,...,9}	{0,2,...,9}
After $X_2=0$	1	0	{0,1}	1	{5,...,9}	{0,2,3,4}	{0,2,4,6,8}	{0,2,...,9}	{0,2,...,9}
After $X_1=0$	1	0	0	1	{5,6,7}	{0,2,3,4}	{0,2,4}	{0,4,6,8}	{0,4,8}
After $O=4$	1	0	0	1	7	{0,3}	4	{0,6}	8
After $T=7$	1	0	0	1	7	{0,3}	4	{0,6}	8
After $R=8$	1	0	0	1	7	{0,3}	4	{0,6}	8
After $W=3$	1	0	0	1	7	3	4	6	8
After $U=6$	1	0	0	1	7	3	4	6	8

6.11

用AC-3算法说明弧相容对图6.1中问题能够检测出部分赋值 $WA = red$，$V = blue$ 的不相容

证明：
(SA,WA)消除不相容,SA={green,blue}
(SA,V)消除不相容,SA={green}
同理，得到NT={blue}, NSW={red}
(Q,NT)消除不相容, Q={red,blue}
(Q,NSW)消除不相容, Q={green}
(Q,SA)消除不相容, Q={}

所以{WA=red, V=blue}不相容

6.12

用AC-3算法求解树结构CSP在最坏情况下的复杂度是多少?

假设有n个顶点，值域中最多有d个取值。树状结构下，弧的条数为$O(n)$，检验每条弧的复杂度为$O(d^2)$.
每条弧只需要检验一次，故总的复杂度为$O(nd^2)$.