SOLUTION FILE

1. Formulate 8 Queen's Problem as a CSP.

Let X be set of variables, D be set of domains and set of constraints.

$X=[Q_1,Q_2, Q_3,Q_4,Q_5,Q_6 ,Q_7,Q_8]$

$D=\{1,2,3,4,5,6,7,8\}$

C_1=<For all i=j=(1,2,3,4,5,6,7,8), (Q_i,Q_j),i!=j>(Not in the same column)
C_2=<For all i=j=(1,2,3,4,5,6,7,8), $Q_i!=Q_j$>(Not in the same row)
C_3=< For all i=j=(1,2,3,4,5,6,7,8), $|Q_i-Q_j|!=|i-j|$ >(Not in the same diagonal)

2. Formulate an empty Sudoku problem as a CSP

Let X be set of variables, D be set of domains and set of constraints.

X=81 variables

- A1, A2, A3, …, I7, I8, I9
- Letters index row, top to bottom
- Digits index column, left to right

	1	2	3	4	5	6	7	8	9
A		6		1		4		5	
B			8	3		5	6		
C	2								1
D	8			4		7			6
E			6				3		
F	7			9		1			4
G	5								2
H			7	2		6	9		
I		4		5		8		7	

$D=\{1,2,3,4,5,6,7,8,9\}$

C_1=<($A_i!=A_j$, $B_i!=B_j$, $C_i!=C_j$, $D_i!=D_j$, $E_i!=E_j$, $F_i!=F_j$, $G_i!=G_j$, $H_i!=H_j$, $I_i!=I_j$), (i!=j)>(numbers in a row are not same)

C_2=<($A_i!=B_i!=Ci!=D_i!=E_i!=F_i!=G_i!=H_i!=I_i$), (i=[1,2,3,4,5,6,7,8,9])>(numbers in a column are not same)

C_3=for each 3x3 block, <$K_i!=K_j$ and $L_i!=L_j$, and $K_i!=K_i$, (i!=j)>

3. Solve the crypt arithmetic problems given in the slides and formulate the crypt arithmetic problem TWO+TWO=FOUR as CSP.

<table>
<tr>
<td>

- SEND
+ MORE
MONEY

</td>
<td></td>
<td>
<table>
<tr><td>S</td><td>9</td></tr>
<tr><td>E</td><td>5</td></tr>
<tr><td>N</td><td>6</td></tr>
<tr><td>D</td><td>7</td></tr>
<tr><td>M</td><td>1</td></tr>
<tr><td>O</td><td>0</td></tr>
<tr><td>R</td><td>8</td></tr>
<tr><td>Y</td><td>2</td></tr>
</table>
</td>
<td></td>
</tr>
</table>

<table>
<tr>
<td>

- TWO
+ TWO
FOUR

</td>
<td>Set of Variables, X=F,T,O,W,U,R

Set of Domains, D={0,1,2,3,4,5,6,7,8,9}

Set of Constraints:
C_1=<F!=0,T!=0>,
C_2=<F!=T,F!=O,F!=W,F!=U,F!=R,T!=O,T!=W,T!=U,T!=R,
O!=W,O!=U,O!=R,W!=U,W!=R,U!=R>,
C_3=<O+O=R,W+W=U,T+T=FO></td>
</tr>
</table>