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CS 2209 Assignment #3
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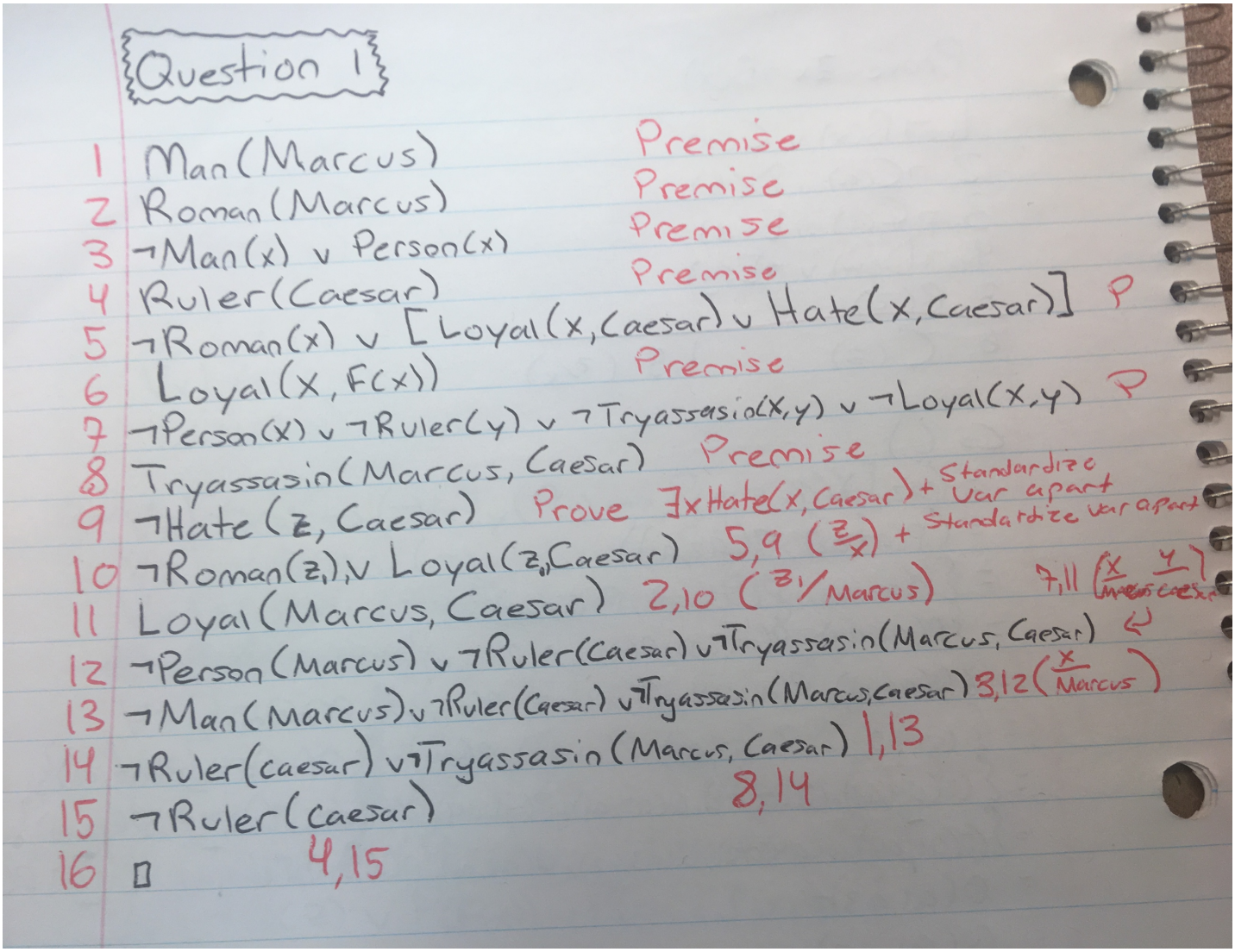
QUESTION 1



Question 1

1	Man(Marcus)	Premise
2	Roman(Marcus)	Premise
3	¬Man(x) ∨ Person(x)	Premise
4	Ruler(Caesar)	Premise
5	¬Roman(x) ∨ [Loyal(x,Caesar) ∨ Hate(x,Caesar)]	P
6	Loyal(x, F(x))	Premise
7	¬Person(x) ∨ ¬Ruler(y) ∨ ¬Tryassasin(x,y) ∨ ¬Loyal(x,y)	P
8	Tryassasin(Marcus, Caesar)	Premise
9	¬Hate(z, Caesar)	Prove ∃x Hate(x, Caesar) + Standardize Var apart
10	¬Roman(z1) ∨ Loyal(z1, Caesar)	5,9 (z/x) + Standardize var apart
11	Loyal(Marcus, Caesar)	2,10 (z1/Marcus) 7,11 (x/Marcus, y/Caesar)
12	¬Person(Marcus) ∨ ¬Ruler(Caesar) ∨ ¬Tryassasin(Marcus, Caesar)	↵
13	¬Man(Marcus) ∨ ¬Ruler(Caesar) ∨ ¬Tryassasin(Marcus, Caesar)	3,12 (x/Marcus)
14	¬Ruler(caesar) ∨ ¬Tryassasin(Marcus, Caesar)	1,13
15	¬Ruler(Caesar)	8,14
16	□	4,15

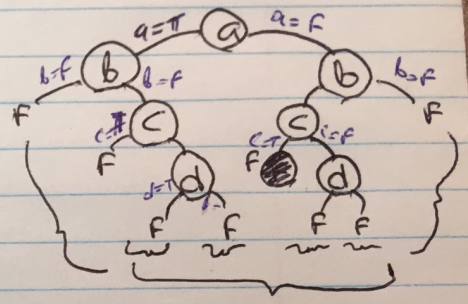
Question 2

2) $\{X_7 = 0, X_8 = 0, X_9 = 1, X_4 = 1, X_5 = 1, X_6 = 0, X_1 = 0, X_2 = 1, X_3 = 1\}$

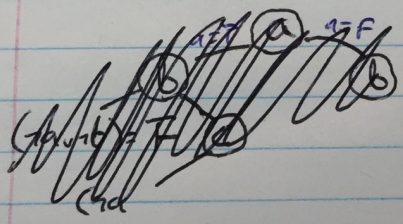
Non-Chronological Backtracking Variable X_a, then flips assignment to 1

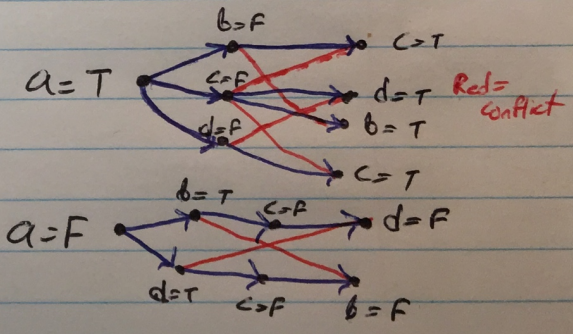
Question 3

Clauses	a = T	a = F
$\neg b \vee \neg d$	T	F
$\neg a \vee \neg c$	T	T
$\neg b \vee \neg c$	T	T
$b \vee c$	F	T
$\neg a \vee \neg d$	T	T
$a \vee d$	T	T
$\neg c \vee \neg d$	T	T
$c \vee d$	F	T
$\neg a \vee \neg b$	T	T
$a \vee b$	T	T



Leads to unsatisfiable b/c results in all conflicts.





Question 4

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Firass-MacBook-Pro:satispy firas$ python solver.py 3queensproblem.txt

Attempting to solve: ((-(a&b&c) & -(a&c) & (a | b | c) & -(d&f) & -(d&e&f) & (d | e | f) & -(d&e) &
 (g | h | i) & -(g&h) & - (a&b) & -(e&f) & -(g&i) & -(g&h&i) & -(a&d) & -(a&g) & -(d&g) & (a | d |
g) & -(h&i) & -(a&d&g) & -(b&d) & -(d&h) & -(b&h) & -(b&d&h) & (b | d | h) & (c | e | i) & -(c&i)
& -(c&e) & -(e&i) & -(a | e | i) & -(c&e&i) & -(c | e | d)))

The expression cannot be satisfied.
Firass-MacBook-Pro:satispy firas$ _
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The answer by the SAT solver is unsatisfiable.

(text document attached)