Homework 3 Written

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1.

A	B	C	~C	B v ~C	A v C	(A v C) ^ (B v ~C)	A v B
T	T	T	F	T	T	T	T
T	T	F	T	T	T	T	T
T	F	T	F	F	T	F	T
T	F	F	T	T	T	T	T
F	T	T	F	T	T	T	T
F	T	F	T	T	F	F	T
F	F	T	F	F	T	F	F
F	F	F	T	T	F	F	F

The KB proves A v B through Entailment because of the rows in the truth table where the KB is true, A v B is also true.

2.
A. Rules in CNF
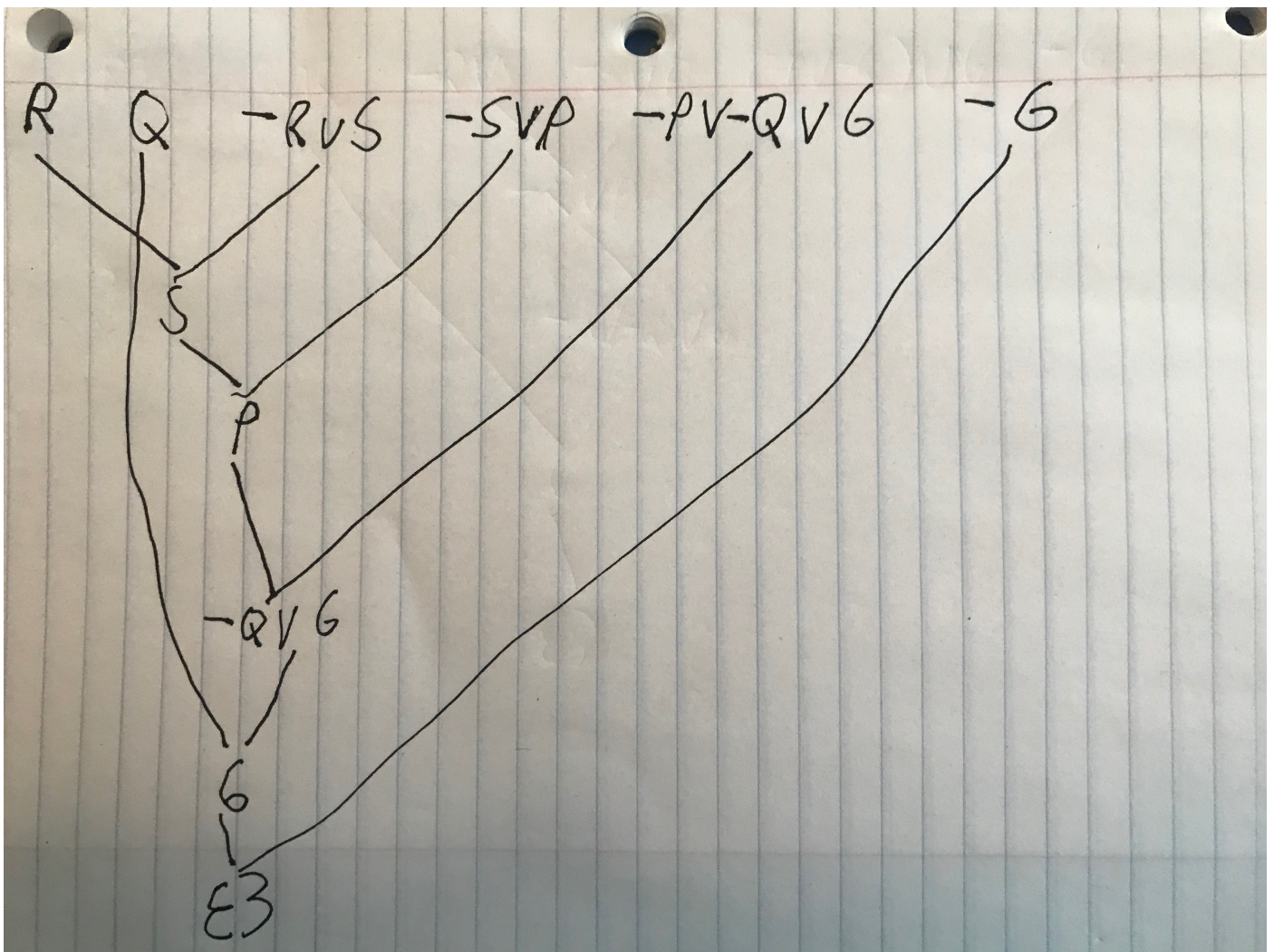   R => S = ~R v S (implication elimination)
   S => P = ~S v P (implication elimination)
   (P ^ Q) => G = ~(P AND Q) v G (implication elimination)
      ~(P ^ Q) v G = (~P v ~Q) v G (de Morgan)
B.

R   Q   -RvS   -SvP   -Pv-QvG   -G

(Resolution proof tree)

S

P

-QvG

G

E3

3.

Constants: GameX, Emulator1, SuperProgrammer, Me

Predicates: Programmer, Emulator, Provides(x,y,z)(X provides y to z) People, Criminal, Friends, Have(x,y)(X has Y), Software, Runs(x,y)(X runs Y), Written(x,y)(X was written by Y)

Functions N/A

KB:

Programmer(X) ^ Emulator(Y) ^ Provides(X,Y,Z) ^ People(Z) -> Criminal(X)

Programmer(SuperProgrammer)

All x friends(x,Me) -> ~have(x, GameX)

Software(Emulator1) ^ runs(Emulator1, GameX) -> Emulator(Emulator1)

Written(Emulator1, SuperProgrammer)

All x Friends(x,Me) ^ People(x) ^ Have(x, Emulator1) -> Provides(SuperProgrammer,Emulator1,x)

4.

A. {x/A, y/B, z/B}

B. No Solution because x cannot be both A and B

C. {x/John, y/John}

D. No Solution

5.

A.

1. Forall x pass(x,History) AND win(x,Lottery) => happy(x)

   Forall x ~(pass(x,History) AND win(x,Lottery)) OR happy(x)

   Forall x (~ pass(x,History) OR ~ win(x,Lottery)) OR happy(x)

   (~ pass(x,History) OR ~ win(x,Lottery)) OR happy(x)

2. Forall x Forall y study(x) OR lucky(x) => pass(x,y)

   Forall x Forall y ~(study(x) OR lucky(x)) OR pass(x,y)

   Forall x Forall y (~study(x) AND ~lucky(x)) OR pass(x,y)

   (~study(x) AND ~lucky(x)) OR pass(x,y)

3. ~study(John) AND lucky(John) (Already in CNF)

4. Forall x lucky(x) => win(x,Lottery)

   Forall x ~(lucky(x)) OR win(x,Lottery)

   ~(lucky(x)) OR win(x,Lottery)

5. Exists x wealthy(x)

   wealthy(P)

B.