Homework 1
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Question 1

A) not a proposition
B) proposition: false. The lottery, while usually requires a purchased ticket, could be won by having a special sort of promotion not requiring purchase.
C) not a proposition
D) not a proposition
E) not a proposition
F) proposition: false. We can measure the height of humans and we have demonstrated that there exist some that are greater than six feet tall.
G) proposition: false. This is false because questions are not propositions due to the fact they aren't stating an opinion but inquiring about a topic.
H) not a proposition
I) proposition: false. Six multiplied by nine is fifty four.
J) not a proposition
K) proposition: true. It is true because $1 + 1 = 2$, which makes the greater than or equal to equality true as well.
L) proposition: false. $1 + 1$ is equal to 2, and not 5.

Question 2

A) I am allergic to penicillin; therefore, taking penicillin may cause a rash. (a note I wrote during a Philmont trip in 2016, for medical records)
B) I don't know if I left my keys at home. (My mom) - She was looking for her keys and couldn't find them.

Question 3

A) $R \wedge \neg Q$
B) $Q \rightarrow R$
C) $R \rightarrow Q$
D) $R \leftrightarrow Q$
E) $R \leftrightarrow (Q \vee P)$
F) $P \wedge Q \wedge R$
G) $R \rightarrow P$
H) $R \rightarrow P$
I) $((P \wedge \neg Q)) \wedge R$

Question 4

A) R: The suspect wore gloves. P: He didn't touch it
$R \oplus \neg P$

B) R: Eat my tie. P: Cubs win the World Series.
$P \rightarrow R$

C) R: it smelled funny. P: Ate it.
$R \wedge P$

D) R: The people gave up their arms. P: Tyrant resigns. Q: Get money back money back.
$R \rightarrow (P \wedge Q)$

E) R: Prizes awarded. P: sufficient number of entries received.
$P \rightarrow R$

F)R: absence of antibodies in body. P: are susceptible to infection.
$R \rightarrow \neg P$

G) R: Participants were timed on this task. P: finished in less than 8 minutes.
$\neg R \wedge P$

H) R: Holds black ink cartridge. P: Holds color cartridge.
$R \oplus P$

I) R: person has a real desire to want to change. P: Puts forth real effort to make those changes. X: Changes come about.
$(R \wedge P) \rightarrow X$

J) R: Lyapunov function exists. P: the system is stable.
$R \leftrightarrow P$

K) R: Regulation applies. P: both houses vote to impose regulation.
$\neg P \vee \neg R$

Question 5
A) I entered the lottery or I won the jackpot.
IB) f I won the jackpot then I entered the lottery.
C) I won the jackpot if and only if I entered the lottery.
D) If I didn't enter the lottery then I didn't win the jackpot.
E) I did not enter the lottery and I did not win the jackpot.
F) I did not enter the lottery, or I entered the lottery and won the jackpot.

Question 6

A) I would first prove that either p is true or q is true, or that both p and q is true.

B) I would first prove that p is true then prove that q is also true, or I could simply prove that p is true and that q is not true, which would leave the only conditional claim that is false. From that, we know all other possibilities lead to true.

C) I would prove that not p is true and demonstrate that p is false, or vice versa.

D) I would prove that p is true and q is true, or that p is false and q is false, and demonstrate that all other condition for p and q is not true.

E) I would prove that p is true and q is false, or that p is false and q is true, or that p is false and q is false.

Question 7 (Bonus)

The TV was on, and the TV was plugged in.