1 Questions

Answers are on the next page. Do not look at the answers before trying to solve the problems.

1. §I: Which of the following are wffs in the language of **PL**?
   (a) $\neg AB$
   (b) $A \wedge B$
   (c) $(A \wedge B)$
   (d) $A \supset B \supset (C \leftrightarrow D)$
   (e) $(A \leftrightarrow B) \vee (\neg D \wedge C)$
   (f) $\neg\neg\neg\neg A \vee \neg A$
   (g) $A \,\&\, (B \leftrightarrow C)$
   (h) $((A \wedge B) \vee C) \supset (D \wedge (E \leftrightarrow (F \supset G))))$
   (i) $(\neg(A \wedge B) \supset C) \leftrightarrow ((D \wedge E) \vee F)$
2. §II: Assuming that A is false, B is true, and C is false, determine the truth values of the following wffs.
   (a) $(A \supset B) \wedge \neg C$
   (b) $(A \wedge (C \leftrightarrow B)) \supset (B \supset A)$
   (c) $(\neg B \wedge C) \vee (B \supset C)$
   (d) $(C \supset B) \wedge (A \supset (C \leftrightarrow (F \wedge G)))$
3. §III: Classify each of the following formulas as either (a) valid; (b) contradictory; or (c) Neither valid nor contradictory
   (a) $P \leftrightarrow ((P \wedge Q) \supset Q)$
   (b) $(P \wedge Q) \leftrightarrow (Q \supset ((P \vee P) \leftrightarrow Q))$
   (c) $\neg(P \wedge Q) \leftrightarrow (\neg P \vee \neg Q)$
   (d) $(P \supset \neg P) \wedge (\neg P \supset P)$
   (e) $(P \wedge (Q \wedge \neg Q)) \supset (P \wedge \neg P)$
4. §IV: For each statement below, indicate whether it is true or false
   (a) If an argument is sound, then it is valid.
   (b) All valid arguments have at least one true premise.
   (c) If an argument is valid, then it's conclusion is true.

2 Answers

1. §I: 'Yes' indicates it's a wff; 'No' indicates that it's not a wff
   (a) No
   (b) Yes
   (c) Yes
   (d) No
   (e) Yes
   (f) Yes
   (g) No
   (h) No
   (i) Yes
2. §II
   (a) True
   (b) True
   (c) False
   (d) True
3. §III
   (a) Neither valid nor contradictory
   (b) Neither valid nor contradictory
   (c) valid
   (d) contradictory
   (e) valid
4. §IV
   (a) True. An argument is sound if it is valid and has all true premises.
   (b) False. It's possible for a valid argument to have only false premises. Example: It's raining in Berkeley and it's not raining in Berkeley. Therefore, either the moon is made of cheese or the moon is not made of cheese.
   (c) False. It's possible for a valid argument to have a false conclusion. An argument is valid just in case under no condition can all of the premises of the argument be true while the conclusion is false. This does not rule out the possibility of the conclusion of a valid argument being false.