Exam #2 Review

I Translate the following statements into symbolic form. Use the letters A, B, C and D as needed.

1) Argentina will reduce unemployment and Brazil will cut taxes, or Columbia will support agrarian reform.

2) Argentina will reduce unemployment if either Brazil reduces taxes or Columbia supports agrarian reform.

3) Both Argentina will reduce unemployment and Brazil will cut taxes provided that Columbia supports agrarian reform.

4) If Argentina reduces unemployment then if Brazil cuts taxes then both Columbia will support agrarian reform and the Dominican Republic will increase government spending.

5) If Argentina's reducing unemployment implies that either Brazil cuts taxes or Columbia supports agrarian reform, then the Dominican Republic will increase government spending.

6) Argentina will reduce unemployment only if neither Brazil cuts taxes nor Columbia supports agrarian reform.

7) It is not the case that Argentina will reduce unemployment unless not both Brazil cuts taxes and Columbia supports agrarian reform.

8) Argentina will reduce unemployment if and only if both Brazil and Columbia do not devalue their currency.

9) Argentina's reducing unemployment is a sufficient condition for Brazil to cut taxes unless Columbia's supporting agrarian reform is a necessary condition for the Dominican Republic to increase government spending.

10) If Argentina's reducing unemployment is a sufficient and necessary condition for both Brazil to cut taxes and Columbia to support agrarian reform, then the Dominican Republic will increase government spending.

II Determine the truth value of the following statements, assuming A & B are true, X & Y are false and P & Q are undetermined. If the truth value of the statement cannot be determined, answer "undetermined."

1) $\sim X \vee Q$
2) $P \equiv X$
3) $(A \supset Y) \supset \sim(Q \cdot B)$
4) $(A \vee \sim P) \equiv (Q \cdot \sim B)$
5) $Q \equiv (Q \vee Y)$
6) $\sim[B \cdot (Y \supset P)]$
7) $(Q \cdot \sim Y) \supset (\sim B \vee X)$
8) $[A \supset (P \cdot Y)] \equiv [Q \supset (A \cdot B)]$
9) $(A \equiv P) \vee (Y \equiv P)$
10) $\sim X \supset [Q \cdot \sim(A \vee P)]$

III Use indirect truth tables to determine whether the following arguments are valid or invalid.

1) P ⊃ Q/ P • R// Q • R
2) P ∨ ~Q// ~Q ⊃ P
3) (M ∨ N) • (C ⊃ B)/ B ≡ (M ⊃ C)/ ~B// M ⊃ ~(C ∨ B)
4) P/ Q/ R// P ≡ (Q ≡ R)
5) P ≡ (D • C)/ D/ C ∨ B/ ~B// P
6) P ⊃ Q/ Q ⊃ (R • S)/ (R • S) ⊃ ~P// P ⊃ ~P
7) M ∨ N/ ~N/ ~M ∨ C// M • ~C
8) G ≡ R/ (R ∨ S) ⊃ T/ ~S • T// G ⊃ (S ≡ ~R)
9) P ∨ Q/ ~(M ∨ N)/ ~M ⊃ ~P// Q ⊃ N
10) R ⊃ S/ S ∨ P/ M • D/ D ⊃ R// S • M

IV Use indirect truth tables to determine whether the following groups of statements are consistent or inconsistent.

1) W ≡ (B • T)/ W • (T ⊃ ~B)
2) Q ⊃ ~(K ∨ F)/ (K • Q) ∨ (F • Q)
3) F ⊃ (D ∨ ~G)/ G ⊃ F/ C ∨ ~D/ C ⊃ (S • M)/ G ≡ S
4) A ≡ (B ∨ C)/ B ⊃ D/ D ⊃ E/ E ⊃ ~B/ A ≡ ~C
5) A ⊃ (B • C)/ B ⊃ (D ∨ ~E)/ C ⊃ (E ∨ ~D)/ A • E

V Use the counterexample method to prove the following arguments invalid.

1) No airline flights that allow smoking are flights that are safe for nonsmokers. Therefore, some airline flights that allow smoking are not international flights, since some flights that are safe for nonsmokers are not international flights.

2) If launching nuclear missiles from submarines requires executive approval, then the threat of nuclear accident is slight. Launching nuclear missiles from submarines does not require executive approval. Therefore, the threat of nuclear accident is not slight.

3) No corporate directors are investigators since all auditors are investigators and no auditors are corporate directors.

4) If the show is good, then the director will be pleased, If the audience applauds, then the director will be pleased. Thus, if the show is good, the audience will applaud.

5) All college professors are teachers, so all teachers are educators, since all college professors are educators.

6) If Sandra misses her plane, then she will be late for this meeting. Sandra will arrive late for this meeting. Therefore, Sandra will miss her plane.

7) Some people with ambition are not dishonest, since some politicians are not dishonest and all people with ambition are politicians.

VI Definitions & Terminology

Be able to define & apply: consistent, inconsistent, valid, invalid.

1) If a truth table establishes that argument is valid, does that prove the argument is good?

2) If a truth table shows an argument is invalid, does that mean its conclusion is *actually* false?

3) Are all good deductive arguments valid? Explain.

4) Does every valid argument necessarily have a true conclusion?

Answers

I

1) (A • B) ∨ C
2) (B ∨ C) ⊃ A
3) C ⊃ (A • B)
4) A ⊃ [B ⊃ (C • D)]
5) [A ⊃ (B ∨ C)] ⊃ D
6) A ⊃ ~(B ∨ C)
7) ~A ∨ ~(B • C)
8) A ≡ (~B • ~C)
9) (A ⊃ B) ∨ (D ⊃ C)
10) [A ≡ (B • C)] ⊃ D

II

1) True
2) Undetermined
3) True
4) False
5) True
6) False
7) Undetermined
8) False
9) True
10) False

III

1) Valid
2) Invalid
3) Valid
4) Valid
5) Valid
6) Valid
7) Invalid
8) Valid
9) Invalid
10) Valid

IV

1) Inconsistent
2) Inconsistent
3) Consistent
4) Inconsistent
5) Consistent

V

1) No snakes are mammals.
   Some mammals are not reptiles.
   ∴ Some snakes are not reptiles
2) If Donald Trump owns all the gold in Fort Knox, then he is wealthy.
   Donald Trump does not own all the gold in Fort Knox.
   ∴ Donald Trump is not wealthy.
3) All fish are animals.
   No fish are mammals.
   ∴ No mammals are animals.
4) If Lincoln was assassinated, then he is dead.
   If Lincoln died of natural causes, then he is dead.
   ∴ If Lincoln was assassinated, then he died of natural causes.
5) All cats are animals.
   All cats are mammals.
   ∴ All animals are mammals.
6) If Dali was beheaded, then he is dead.
   Dali is dead.
   ∴ Dali was beheaded.
7) Some animals are not mammals.
   All dogs are animals.
   ∴ Some dogs are not mammals.

VI

1) No, it could still be unsound (have false premises).
2) No, it only shows the logic is bad.
3) Yes. For an argument to be good, the premises must support the conclusion. Any deductive argument that meets this condition is considered valid.
4) No. The premises support the conclusion, but if the premises are false, the conclusion may be as well.