Introduction to Logical Reasoning

Problem Set #10

Although I strongly suggest that you write out answers to all these problems, you do *not* have to turn in any written responses. You do, however, need to be prepared to do these types of problems, for questions on the weekly quizzes and exams will primarily be drawn from the problem sets. The solutions to these problems will be provided, so you can check your own work and seek help from me as necessary.

We will devote considerable time to these types of problems during the next in-class workshop. In order to make that workshop productive, please make a solid start on them. That way you can use the workshop to address the difficulties you are facing.

If you do the extra credit logic puzzle, you must turn in a computer-type-written solution at the beginning of class on Wednesday, November 16TH.

Part A Instructions

Each of the following problems presents an valid argument. Use natural deduction to construct that argument's formal proof of validity. The number of steps in these proofs will vary, but some might require four or five steps to complete. Keep in mind that the final line in the proof is always the conclusion of the argument being proved.

Part A Problems

1.
   1. A → B.
   2. A ∨ (C & D).
   3. ~B & ~E.

   ∴ C.

2.
   1. (F → G) & (H → I).
   2. J → K.
   3. (F ∨ J) & (H ∨ L).

   ∴ G ∨ K.

3.
   1. (~M & ~N) → (O → N).
   2. N → M.
   3. ~M.

   ∴ ~O.

4.
   1. (K ∨ L) → (M ∨ N).
   2. (M ∨ N) → (O & P).
   3. K.

   ∴ O.

5.
   1. (Q → R) & (S → T).
   2. (U → V) & (W → X).
   3. Q ∨ U.

   ∴ R ∨ V.

6.
   1. W → X.
   2. (W & X) → Y.
   3. (W & Y) → Z.

   ∴ W → Z.

7.
   1. A → B.
   2. C → D.
   3. A ∨ C.

   ∴ (A & B) ∨ (C & D).

8.
   1. (E ∨ F) → (G & H).
   2. (G ∨ H) → I.
   3. E.

   ∴ I.

9.
   1. J → K.
   2. K ∨ L.
   3. (L & ~J) → (M & ~J).
   4. ~K.

   ∴ M.

10.
   1. (N ∨ O) → P.
   2. (P ∨ Q) → R.
   3. Q ∨ N.
   4. ~Q.

   ∴ R.

Part B Instructions

Each of the following problems presents a valid argument in English. Translate each into the language of symbolic logic, putting it into argumentative form. Then use natural deduction to construct that argument's formal proof of validity. The number of steps in these proofs will vary, but some might require up to six steps to complete. Keep in mind that the final line in the proof is always the conclusion of the argument being proved.

Part B Problems

Do arguments 1–10 from Exercises C on pages 391–393 in the Irving Copi and Carl Cohen handout on "Constructing More Extended Formal Proofs".

Note: There may a lot of exercises here. Do not feel obligated to do all of them. I often assign many exercises so that you have plenty of opportunities to practice the skills these exercises are trying to impart. I suggest doing just enough of them so that you are confident that you could use these skills on a quiz or an exam.

Extra Credit Logic Puzzle

In Washington, D.C., politicians never ever tell the truth, and all non-politicians always tell the truth. Last summer, I did a census in Washington, D.C., to see whether there was any correlation between truth-telling and smoking. I interviewed everyone in Washington, D.C., and they all said the same thing: "At least one politician in Washington, D.C., smokes".

Question: What can be determined about Washington, D.C.? Are there any non-politicians? Any politicians? Any smokers? Any nonsmokers?

To receive full credit you must justify your answer with a logical argument showing why you are 100% right. That is to say, this question has a definitive answer that can be justified without *any* guessing on your part.