CRITICAL THINKING

Workshop #8: Natural Deduction

Part I: Each of the following problems presents a valid argument. Use natural deduction to construct that argument's formal proof of validity. Each proof can be completed in just *two* steps. Keep in mind that the final line in the proof is always the conclusion of the argument being proved.

1. 1. $(W \vee X) \rightarrow Y$.
   2. W.
   ∴ Y.

2. 1. $D \rightarrow E$.
   2. $(E \rightarrow F) \,\&\, (F \rightarrow D)$.
   ∴ $D \rightarrow F$.

Part II: The following problem presents a valid argument. Use natural deduction to construct that argument's formal proof of validity. This proof can be completed in just *three* steps. Keep in mind that the final line in the proof is always the conclusion of the argument being proved.

1. 1. $Q \rightarrow R$.
   2. $R \rightarrow S$.
   3. $\sim S$.
   ∴ $\sim Q \,\&\, \sim R$.

Please continue ▶

Workshop #8: Natural Deduction (Continued)

Part III: Each of the following problems presents a valid argument in English. For each, (1) translate it into the language of symbolic logic, using the indicated capital letters to label each simple positive statement involved, (2) put it into its argumentative form, and (3) use natural deduction to construct that argument's formal proof of validity. Each proof can be completed in no more than *four* steps, but I'm not saying the exact number.

1. Either the business students **love** logic, or the business students **study** hard only if the professor **quizzes** them on the material. But if the business students do not **love** logic, then the professor **quizzes** them on the material only if he wants them to **understand** the material. The business students do not **love** logic. Therefore, if the business students **study** hard then the professor wants them to **understand** the material. (L, S, Q, U)

2. If the **information** systems students love logic, then the **business** students love logic. If both the **information** systems and **business** students love logic, then either the computer **science** or **computational** biology students love logic. If the computer **science** or **computational** biology students love logic, then the **professor** is not sad. If the **information** systems students loving logic is a sufficient condition for the **professor** not being sad, then the **dean** is pleased. As a result, the **dean** is pleased. (I, B, S, C, P, D)

You're done!