Philosophy 500 — Midterm, May 26

Instructions:

1. You have the full 3 hours and 15 minutes for this exam. *I recommend checking all your answers carefully, or even doing it over again and comparing the two.* If you need more time, that's not a problem, just let me know at the end of class.
2. Read the instructions and all the questions carefully before writing anything. Answer all questions in the answer booklet and write your name on the front. A perfect score on this test is 100 points.
3. When doing truth tables, make sure your T's are clearly T's and your F's clearly F's. Do not try to turn a T into an F or viceversa, because the result is usually ambiguous and I'll mark it as wrong. Truth tables must only contain rows which make sense. In other words, when doing a partial truth table, don't include any rows that yielded contradictions in your final table.

A. Relating logical concepts: For each of the following, state whether it's true or false, and either explain **in full detail and in paragraph form** why it's true or give an example to show that it's false. **Note**: If you give an example which works, you will get full credit. On the other hand, if you give an example that doesn't work, it might be good to have something written about it to help me know what had in mind when I'm assigning any partial credit (also: *trying to explain why it works might help you realize it doesn't work*). (40 points).

1. If a valid argument has a true conclusion, it also has true premises.
2. If the argument $A, B \therefore C$ is invalid, $A \rightarrow C$ is contingent.
3. If A is logically equivalent to B, $A \rightarrow B$ is a tautology.
4. If $\{A, B\}$ is an inconsistent set, $A \rightarrow B$ is a contradiction.
5. If $A \vee B$ is a contradiction, A and B are both contradictions too.

B. Translations: Convert each of the following sentences into symbolic form, preserving its logical structure, using the key given below (15 points).

A: Andy likes gorgonzola.
B: Betty likes gorgonzola.
C: Cathy is a chef.
D: Dirk is a chef.

1. Either Andy or Betty likes gorgonzola, but they don't both like it.
2. Cathy is a chef if Dirk is a chef, but Dirk is a chef only if Andy likes gorgonzola.
3. Unless Andy likes gorgonzola, either Cathy or Dirk is a chef.
4. If Andy likes gorgonzola, it isn't the case that Cathy and Dirk are both chefs.
5. Cathy is a chef, but Dirk is only a chef if Betty and Andy both like gorgonzola.

C. Tree diagrams: Draw a tree diagram for each of the following which are proper sentences. For those which aren't proper sentences, write 'Gibberish' instead. (15 points).

1. $\neg[\neg(A \,\&\, \neg B) \rightarrow \neg C]$
2. $(A \,\&\, \neg B) \,\&\, \neg C \rightarrow (A \,\&\, B)$
3. $\neg B \vee \neg[(A \,\&\, \neg C) \leftrightarrow \neg B]$
4. $(A \,\&\, \neg B) \rightarrow [A \,\&\, (B \neg C)]$
5. $A \rightarrow \neg[(A \,\&\, \neg\neg C) \leftrightarrow \neg B]$

D. Applying truth tables: Answer each of the following, showing your answer is right by means of a truth table (partial or complete, but I recommend avoiding doing a complete table unless it's necessary). Make explicit which rows (or all of them if that's the case) yielded your answer. (30 points).

1. Is the set $\{\neg A \rightarrow \neg B, \neg(A \,\&\, B), \neg B \rightarrow (A \,\&\, B)\}$ consistent?
2. Is the argument $A \leftrightarrow B, C \rightarrow \neg B \therefore \neg C \vee B$ valid?
3. Are the sentences $(A \vee \neg B) \,\&\, (C \vee A)$ and $(B \leftrightarrow A) \,\&\, (\neg A \rightarrow C)$ logically equivalent?
4. Is the sentence $[A \leftrightarrow (A \& \neg B)] \rightarrow \neg(A \& B)$ a tautology, a contradiction, or contingent?
5. Is the argument $A \rightarrow \neg B, \neg(B \,\&\, \neg A) \therefore A \,\&\, \neg B$ valid?

Remember to check your answers.

Good luck!