Exercise Set 12

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This question was on the previous homework, but we hadn't discussed it in class. I'm asking it again. It asks you to show the relevance logic B actually is a relevance logic. That is, if $X \supset Y$ is valid in the semantics we discussed in class for B, then X and Y must share a propositional variable (called "propositional parameter" below). The problem is taken directly from Graham Priest's book.

(a) Let $\bot$ and $\bot^*$ be a pair of non-normal worlds such that every propositional parameter is true at $\bot$ and false at $\bot^*$. Suppose that $R\bot\bot\bot$, $R\bot^*\bot\bot^*$, and that each world accesses no other worlds. Show that every formula is true at $\bot$ and false at $\bot^*$.

(b) Let w and w^* be a pair of non-normal worlds such that $Rw\bot w$ and $Rw^*\bot w^*$. Using part (a), show that: (i) if every parameter in A is true at w and false at w^*, the same is true of A; (ii) if every parameter in B is false at w and true at w^*, the same is true of B.

(c) Use this to show that if $A \supset C$ is valid in B, then A and C share a propositional parameter.