MATH 318, Assignment 4

Kyle Rubenok, 260667187

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1. The set $\{\vee, \wedge\}$ is not functionally complete. We can prove this by showing it is not 1-complete. Take the $\neg$ operator. Regardless of what input we give to any combination of $\{\vee, \wedge\}$, $T \wedge T \leftrightarrow T$ and $F \wedge F \leftrightarrow F$. There is no way to invert the input and achieve equivalence to $\neg$

2. Take for example the formula $p \vee \neg p$. If we attempt to replicate this with the set $\{\oplus\}$. Considering the operations available, it's clear that outside of the identity function of $p = T$ any formulas constructed with combinations of p and $\oplus$ such as $p \oplus p$ and so on will be logically false. This makes replicating the formula $p \vee \neg p$ and many others impossible. Thus $\{\oplus\}$ is not functionally complete.