QUESTION 8

Claim: For any two propositions P, Q, $\neg P \wedge \neg Q$ is equivalent to $\neg[P \wedge Q]$.

Proof: Suppose that $\neg P \wedge \neg Q$ is true. Then both $\neg P$ and $\neg Q$ are true.

So P and Q are both false. Thus $P \wedge Q$ is false. Hence $\neg[P \wedge Q]$ is true.

This argument clearly works the other way. So we have implication in both directions, which proves the claim.