1 Prove the following theorems using only basic and hypothetical rules.

a $\vdash A \vee (B \wedge C) \leftrightarrow (A \vee B) \wedge (A \vee C)$

b $\vdash [(A \rightarrow B) \vee C] \rightarrow (C \vee B) \vee \neg A$

2 Prove the following theorems/contradictions. You may use derived rules and logical laws(aka rules of replacement).

a $\vdash ((A \wedge B) \rightarrow (B \wedge A)) \wedge (\neg(A \wedge B) \rightarrow \neg(B \wedge A))$

b $\nvdash ((H \wedge F) \rightarrow C) \wedge \neg(H \rightarrow (F \rightarrow C))$