

Write out proofs of the following using the rules of \mathcal{F} . Do *not* cite Taut Con. Turn in your proofs to your preceptor's mailbox in 1879 Hall.

$$1. \quad \left| \begin{array}{l} \neg(A \rightarrow B) \\ \hline A \wedge \neg B \end{array} \right.$$

$$2. \quad \left| \begin{array}{l} (A \vee B) \rightarrow \neg A \\ \hline \neg A \end{array} \right.$$

$$3. \quad \left| \begin{array}{l} (A \rightarrow A) \rightarrow B \\ (\neg B \wedge \neg C) \vee D \\ \hline D \end{array} \right.$$

For the next two problems, you can use DeMorgan's equivalences as if they were rules of \mathcal{F} . Whenever you use one of these equivalences, cite "DeMorgan's" plus the appropriate line number.

$$4. \quad \left| \begin{array}{l} A \rightarrow (B \vee \neg C) \\ C \rightarrow (\neg B \vee D) \\ (A \wedge C) \rightarrow \neg D \\ \hline \neg A \vee \neg C \end{array} \right.$$

$$5. \quad \left| \begin{array}{l} \\ \hline (A \rightarrow B) \vee (\neg A \rightarrow C) \end{array} \right.$$