Exercise (Logical Equivalence)

1) With truth tables check if $\neg(P \vee (\neg P \wedge q)) \equiv \neg(P \vee q)$ is true or false.

2) Simplify the expression $\neg(P \wedge q) \vee (P \wedge q)$

3) Simplify the expression $(\neg P \wedge (P \vee q))$

4) **Without** a truth table prove $\neg(P \rightarrow q) \equiv P \wedge \neg q$

5) **Without** truth table prove $\neg(P \vee (\neg P \wedge q)) \equiv \neg(P \vee q)$