Problem 1. Consider the following two circuits where $P$ and $Q$ are the input signals. Are these two circuits logically equivalent?

(1) Circuit 1:

(2) Circuit 2:

Problem 2. Consider the following proposition.

$$\sim (\sim (P \rightarrow Q) \lor (P \land Q))$$

(1) Draw a circuit that computes the above proposition.
(2) Trace through the circuit and write its truth table.
(3) Convert the truth table from (2) to a proposition in the form $(? \land ?) \lor (?)$.
(4) Convert the proposition from (3) to a circuit.
(5) Can you simplify the circuit? Draw a logically equivalent circuit that uses only one gate.

Problem 3. Design a circuit that takes four inputs $A, B, C, D$ and outputs true if AT LEAST three of the four inputs are true.