CS 135 Spring 2019: Problem Set 1.

Start each problem on a separate page. Submit your solutions on Canvas as ONE pdf file.
Due Friday, February 1 before 11:59pm.

Problem 1. (10 points) Use only the laws of propositional logic and the rules of inference for the following. Be sure to show every step of your proof.

a. Prove that the proposition $(p \to q) \vee (q \to p)$ is a tautology.
b. Prove that the proposition $(p \wedge (p \to q)) \vee \neg((\neg p \vee q) \wedge p)$ is a tautology.

Problem 2. (20 points) Give the form of each argument below, suitably replacing each phrase with a symbol. Then prove whether the argument is valid or invalid. For valid arguments, use the rules of inference to prove validity. If the argument is invalid, give a counterexample.

(a) If I get a job, then I will buy a new car or a new house (or both).
I won't buy a new house.
∴ I will not get a job.

(b) I will buy a new car and a new house only if I get a job.
I am not going to get a job.
I will buy a new house.
∴ I will not buy a new car.