

Note on integrity: You may discuss problems with fellow students, but all written work must be entirely your own, and should not be from any other course, present or past. If you use a solution from another source you must cite it, including from other people who help you.

Questions

(1) Translate the following arguments into propositional formulas:

- (a) If either wages or prices are raised, there will be inflation. If there is inflation, then either Congress must regulate it or the people will suffer. But if the people suffer, then congressmen will be unpopular. However, Congress does not regulate inflation and congressmen are not unpopular. Therefore, wages do not rise.
- (b) Jones has filed a lawsuit against Rogers because of a contract. Jones will win the lawsuit if and only if Rogers has entered into the contract, the contract is legal, and Rogers has not performed the contract. Rogers has entered into the contract only if he has accepted Jones' offer. But, in fact, Rogers has not accepted Jones' offer. Therefore Jones will lose the lawsuit.

(2) Find evidence for the following formulas

- $((P \wedge Q) \Rightarrow R) \Rightarrow (P \Rightarrow (Q \Rightarrow R))$ (*currying*)
- $(P \Rightarrow (Q \Rightarrow R)) \Rightarrow ((P \wedge Q) \Rightarrow R)$ (*uncurrying*)
- $(\neg(P \wedge Q) \wedge ((P \vee \neg P) \wedge ((Q \vee \neg Q) \wedge \neg(P \wedge Q)))) \Rightarrow (\neg P \vee \neg Q)$

(3) Assume $(P \vee \neg P)$ and $(Q \vee \neg Q)$ and prove the following formulas

- $(P \Rightarrow Q) \vee \neg(P \Rightarrow Q)$
- $(P \wedge Q) \vee \neg(P \wedge Q)$
- $(P \vee Q) \vee \neg(P \vee Q)$

This means that $(P \wedge Q)$, $(P \vee Q)$, and $(P \Rightarrow Q)$ are decidable propositions if P and Q are.