

1. Simplify so that negation only appears right before the variables: $\neg(\neg A \vee (B \rightarrow \neg C))$.

2. Lena, Jerry, Chuck, and Errol were all playing blackjack. Lena was the dealer, and got a 17. If another player beats 17, they win, while if they tie or get lower, they lose. You know:
 - (a) If Jerry lost or Chuck lost, then Errol also lost.
 - (b) If Errol lost or Chuck won, then Jerry lost.
 - (c) If Jerry won, then Chuck lost.
 - (d) Chuck, Errol, and Jerry did not all lose.

Who won?

3. Make a truth table for $P \vee (Q \rightarrow \neg P)$.

4. Prove one of the following. (For a challenge, prove choice (c).)

(a) Prove that for all integers n , if $7n$ is odd, then n is odd.

(b) Prove that $\sqrt{7}$ is irrational.

(c) For all integers n , $n^5 - n$ is divisible by m . Find the largest m for which this statement is true, and prove it.