CS441 – Discrete Structures for Computer Science
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Problems from Section 1.5

18. We know that *some* s exists that makes $S(s, \text{Max})$ true, but we cannot conclude that Max is one such s. Therefore this first step is invalid.

24. Steps 3 and 5 are incorrect; simplification applies to conjunctions, not disjunctions.

Problems from Section 1.6

6. An odd number is one of the form $2n+1$, where n is an integer. We are given two odd numbers, say $2a+1$ and $2b+1$. Their product is $(2a+1)(2b+1) = 4ab + 2a + 2b + 1 = 2(2ab + a + b) + 1$. This last expression shows that the product is odd, since it is of the form $2n+1$, with $n = 2ab + a + b$.

18. a) We must prove the contrapositive: If n is odd, then $3n+2$ is odd. Assume that n is odd. Then we can write $n = 2k+1$ for some integer k. Then $3n+2 = 3(2k+1)+2 = 6k+5 = 2(3k+2)+1$. Thus $3n+2$ is two times some integer plus 1, so it is odd.

b) Suppose that $3n+2$ is even and that n is odd. Since $3n+2$ is even, so is $3n$. If we add subtract an odd number from an even number, we get an odd number, so $3n - n = 2n$ is odd. But this is obviously not true. Therefore our supposition was wrong, and the proof by contradiction is complete.