Homework 4

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1. Simplification
2. Disjunctive syllogism
3. Modus ponens
4. Addition
5. Hypothetical syllogism

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20.

1. Statement is invalid. a = -1 serves as a counterexample.
2. Valid by modus ponens

24.

There is an error at step 3. It is not possible to use the simplification rule since you would need P(c)∧Q(c) not P(c)∨Q(c). A similar error is made on step 5. Another error exists on step 7. Using the conjunction rule would result in ∀x( P(x)∧Q(x) ) not ∀x( P(x) ∨Q(x) ).

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6.

Let n and m be 2 odd integers

1. n = 2k+1
2. m = 2j+1
3. nm = (2k+1)(2j+1) = 4kj+2k+2j+1
4. nm is odd

8.

Using contradiction, assume n+2 is a perfect square when n is a perfect square.

1. n = x^2 where x is some integer
2. n+2 = y^2 where y is some integer
3. (n+2)-n = 2
4. y^2-x^2 = 2
5. (y+x)(y-x)=2
6. Let (y+x) = 2 and (y-x)=1
7. (y+x)+(y-x) = 3
8. 2y = 3
9. y = 3/2
10. y is not an integer hence (n+2) is not a perfect square if n is a perfect square.