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Homework 2

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Problem 1

To prove that n is even if and only if 7n+4 is even requires that we prove:

1. n is even → 7n+4 is even
2. 7n+4 is even → n is even

To prove the first proposition we can use a direct proof. Given that n is even we can represent it as two times some quantity (in this case k). If we substitute 2k in for n into the equation 7n+4 we get 7(2k)+4. Which is equivalent to 2(7k+2). Since we can write 7n+4 in an equation that is two times some quantity we have shown it is even given n is even.

For the second proposition we can use a proof by contraposition. The contrapositive of the second proposition is given n is odd 7n+4 is odd. We can prove this statement using a direct proof. Given n is odd we can rewrite it as two times some quantity k plus 1. This gives us the equation 7(2k+1) +4. This equation can be written 2(7k+5)+1. Since we have proved the contrapositive we can infer that the original proposition is true.

Therefore, given that we have prove the two propositions we can infer that the original statement "n is even if and only if 7n+4 is even" is true.

Problem 2

For any value of x in R the results of these equations are either positive or negative. They can all be negative, and we could pick any two to multiply and get a positive. They could all be positive and the same would hold. We could have two positive and one negative solution and get a positive result by multiplying the two positive equations. We could have two negative and one positive and multiply the two negative results. Given that there are three equations there will always be either two positive results to choose from or two negative results to choose from to get the nonnegative end result.