CSE311 Quiz Section: October 11, 2012

1 Let's learn about Cartesian products and powersets.

2 Logical equivalence with quantifiers

7th edition: 1.4: 43, 45;   6th edition: 1.3: 43, 45

Determine whether the following are logically equivalent:

1. $\forall x(P(x) \rightarrow Q(x))$ and $\forall x P(x) \rightarrow \forall x Q(x)$
2. $\exists x(P(x) \vee Q(x))$ and $\exists x P(x) \vee \exists x Q(x)$

3 Use inference rules with quantified premises and conclusions

7th edition: 1.6: 27, 29;   6th edition: 1.5: 27, 29

1. Premises: $\forall x(P(x) \rightarrow (Q(x) \wedge S(x)))$, $\forall x(P(x) \wedge R(x))$
   Conclusion: $\forall x(R(x) \wedge S(x))$
2. Premises: $\forall x(P(x) \vee Q(x))$, $\forall x(\neg Q(x) \vee S(x))$, $\forall x(R(x) \rightarrow \neg S(x))$, $\exists x \neg P(x)$
   Conclusion: $\exists x \neg R(x)$

4 Extra: Prove that the square of a natural number n is always larger than the sum of all the numbers between 1 and n ($1, n$ included).