Homework 2 for ECS 20

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October 12, 2019

This assignment was made with ♡ (and LaTeX).

Contents

1 Question 1

1.1 Part 1

The first statement is true because the set of nonnegative integers starts with 0 and 0 is equal to or less than said set.

1.2 Part 2

The second statement is false because for a said integer n, there will be an integer m that is greater than the one integer n given.

1.3 Part 3

The third statement is true because for all given integer m(s) there can be an integer n that is greater than that one individual m in the spanning set of multiple m(s).

2 Question 2

The satement is not valid (Not a Tautology)

p	q	r	$\neg r$	$p \to r$	$q \to r$	$\neg(p \vee q)$	$((p \to r) \wedge (q \to r) \wedge (\neg(p \vee q))) \to \neg r$
T	T	T	F	T	T	F	T
T	T	F	T	F	F	F	T
T	F	T	F	T	T	F	T
T	F	F	T	F	T	F	T
F	T	T	F	T	T	F	T
F	T	F	T	T	T	F	T
F	F	T	F	T	T	T	F
F	F	F	T	T	T	T	T

3 Question 3

3.1 part 1

There is a course = $\exists y$
Every freshman = $\forall x \in F(x)$
Taking the class = $T(x, y)$

$\exists y \forall x [F(x) \rightarrow T(x, y)]$

3.2 part 2

No student = $\exists x$
That is a Freshman is also Sophomore = $F(x) \land S(x)$
Negate statement for final result
$\neg(\exists x [F(x) \land S(x)])$

3.3 part 3

Some student = $\exists x$
Some course = $\exists y$
Taking course = $T(x, y)$
Some freshman is in advanced course and is taking it.
$\exists x \exists y [F(x) \land A(y) \land T(x, y)]$

4 Question 4

p = math major q = CS major r = Discrete s = smart

$p \lor q$
$\neg r \rightarrow \neg p$
$r \rightarrow s$
$\neg q$
p $\longrightarrow$ p or q and not q is p
r $\longrightarrow$ modus tollens of (not r implies not p, then p, therefore r)
s $\longrightarrow$ modus ponens of p implies s , p therefore s

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s

5 Answers

My answer for 1 , 1.1 , 1.2 , 1.3 , 2 , 3 , 3.1 ,3.2, 3.3, 4 are on pages ii and iii.