Midterm 1 Version 1 Review

March 29, 2020

Question 1

a. Because we know

$S_1 = \{aa, bb, cc, aab, aac, aaa, bba, bbb, bbc, cca, ccb, ccc, aaaa, \dots\}$ and S_2 is a set of all strings over U with length 3, we can conclude

$$S_1 \cap S_2 = \{aaa, aab, aac, bba, bbb, bbc, cca, ccb, ccc\}$$

b. See table below

p	q	r	$\neg r$	$p \vee q$	$p \vee q \Rightarrow \neg r$
T	T	T	F	T	F
T	T	F	T	T	T
T	F	T	F	T	F
F	T	T	F	T	F
T	F	F	T	T	T
F	T	F	T	T	T
F	F	T	F	F	T
F	F	F	T	F	T

c. Let $x \in \mathbb{N}$, and $y =$ _____.

We will prove that predicate $P(x, y)$ is true, or predicate $Q(x, y)$ is true.

Correct Solution:

Let $x =$ _____, and $y \in \mathbb{N}$.

We will prove that **both predicates $P(x, y)$ and $Q(x, y)$ are false.**

Notes:

- How can I proceed a proof when there is $\vee$ on R.H.S of the statement? What's the general structure of proof given this symbol?

Question 2

a. $\exists x \in P,\ Student(x) \wedge Attends(x)$

b. $\forall x \in P,\ \exists y \in P, Student(y) \wedge Attends(y) \Rightarrow Loves(x, y)$

Question 3

Question 4