Midterm 1 Version 1 Review 2

July 17, 2020

1. a) $aaa, aab, aac, bba, bbb, bbc, cca, ccb, ccc$

   b) **Solution:**

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

   c) $\exists x \in \mathbb{N}, \forall y \in \mathbb{N}, \neg P(x, y) \wedge \neg Q(x, y)$

   > **Correct Solution:**
   >
   > Let $x = $ ____. Let $y \in P$.
   >
   > We need to prove $\neg P(x, y)$ and $\neg Q(x, y)$ are true.

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

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

   > **Correct Solution:**
   >
   > $\forall x \in P, \exists y \in P, Student(y) \wedge Attends(y) \wedge Loves(x, y)$

   c) $\forall x \in P, Student(x) \wedge Attends(x) \Rightarrow Loves(x, x)$

   d) $\forall x, y \in P, x \neq y \Rightarrow Loves(x, y) \Rightarrow Attends(x) \vee Attends(y)$