# Midterm 1 Version 3 Solution

March 19, 2020

## Question 1

a. Since $S_1 = \{ab, ba, aab, bba, baa, \dots\}$ and $S_2 = \{aaa, aab, aba, baa, abb, bab, bba\}$,

$S_2 \setminus S_1 = \{aaa, aab, aba, bab\}$

**Correct Solution:**

Since $S_1 = \{ab, ba, aab, abb, bba, baa, \dots\}$ and $S_2 = \{aaa, aab, aba, baa, abb, bab, bba, bbb\}$,

$S_2 \setminus S_1 = \{aaa, aba, bab, bbb\}$

b. See table below

| $p$ | $q$ | $r$ | $\neg r$ | $p \Rightarrow q$ | $(p \Rightarrow q) \Leftrightarrow \neg r$ |
|---|---|---|---|---|---|
| T | T | T | F | T | F |
| T | T | F | T | T | T |
| T | F | T | F | F | T |
| F | T | T | F | T | F |
| T | F | F | T | F | F |
| F | T | F | T | T | T |
| F | F | T | F | T | F |
| F | F | F | T | T | T |

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

We will prove that $P(x)$ is true and $Q(x, y)$ or $Q(x, y+1)$ is false.

## Question 2

## Question 3

## Question 4