Verification and Control of CPS: Assignment 4
Due Date: Thursday, October 23rd, 2014 (4:30 PM)

P1. Consider the following traces (ω-strings) involving systems with state variables x, y

x	1	0	1	0	-1	0	1	0	-1	1	-1	1	(-1	1)$^\omega$	$\cdots$
y	0	-1	0	-1	-1	0	2	0	-1	2	-1	2	(-1	2)$^\omega$	$\cdots$

For each of the temporal formulas below, explain whether or not they hold on the trace. Write a short justification.

(a) $\Box(x > 0)$

(b) $\Diamond(x \leq 0)$

(c) $\Diamond\Box(y \leq x)$

(d) $\Box\Diamond(y = x)$.

(e) $\Diamond\Box(|x - y| \leq 1)$

(f) $(y \leq x)$

(g) $(y \leq x)\ \mathcal{U}\ (y = 2)$

(h) $(|x - y| \leq 1)\ \mathcal{U}\ (|x - y| = 2)$.

(i) $\bigcirc(x - y = 1)$.

P2 Draw ω-automata for formulae (a), (c), (e), (g) and (i) above.

P3 Consider the following system:

```
state x : int initially 0;
state y : int initially 0;
        if ( x == 1)
                x := 0; y := 0 ;
        else
                x := 1; y := -1;
```

For each of the formulae (a) - (i) in P1, explain whether they hold on the system or not with a short justification.