HW 6

作业1:

(1) $[-\infty, 2]$ (2) $[0, 2]$ (3) $[1, 5]$ (4) $[2, +\infty]$

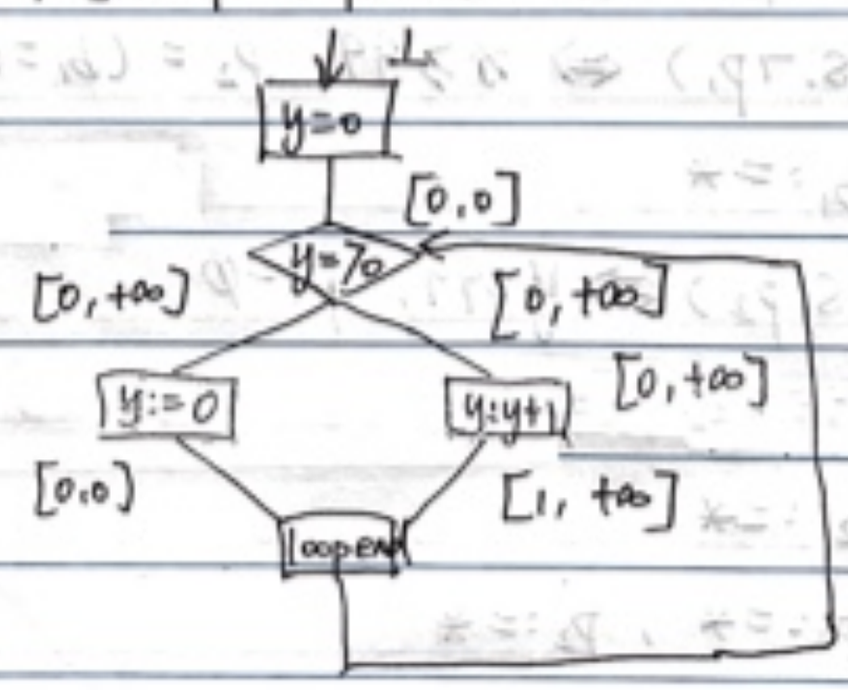
作业2:

Bp var y=0 ;
while (1) {
if (y==7o) y=0 ;
else y=y+1 ;
}

① least fixed point:

$[0,0] \to [0,1] \to \cdots \to [0,7o] \to [0,7o]$ (fixed point)

② widening & narrowing:



作业3:

① $post^{\#}(x := x+1, x<100)$

(1) $sp(x := x+1, x<100) \Leftrightarrow x<101$

(2) $\phi' \equiv (b_1 = * \wedge b_2 = *)$ (不确定 $x<100$ 或 $y=100$)

② $post^{\#}(x := x+1, x<100 \wedge y=100)$

(1) $sp(x := x+1, x<100 \wedge y=100) \Leftrightarrow (x<101 \wedge y=100)$

(2) $\phi' \equiv (b_1 = * \wedge b_2 = 1)$

作业4:

① 1 → 2

(1) p_1 $wp(S, p_1) \Leftrightarrow T$. $p_1 = (b_1 = * \wedge b_2 = *)$

$wp(S, \neg p_1) \Leftrightarrow \bot$, $p_2 = \emptyset$

trans $p_1 \Rightarrow b_1 := true$

(2) p_2 $wp(S, p_2) \Leftrightarrow y = 100$. $p_1 = (b_1 = * \wedge b_2 = 1)$

$wp(S, \neg p_2) \Leftrightarrow y \neq 100$, $p_2 = (b_1 = * \wedge b_2 = 0)$

trans $b_2 := *$

conclude: $p_1 := 1$.

② 2 → 1

(1) p_1 $wp(S, p_1) \Leftrightarrow x < 99$, $p_1 = \emptyset$

$wp(S, \neg p_1) \Leftrightarrow x \geq 99$, $p_2 = (b_1 = 0 \wedge b_2 = *)$

trans $b_1 := *$

(2) p_2 $wp(S, p_2) \Leftrightarrow y = 99$. $p_1 = \emptyset$

$wp(S, \neg p_2) \Leftrightarrow y \neq 99$, $p_2 = (b_1 = * \wedge b_2 = 1)$

trans $b_2 := *$

conclude: $p_1 := *$, $p_2 := *$