

I. Testcase 목록

i. Analysis

1) Command:

```
1  a := 10;  
2  b := 5;  
3  while (not (a <= 0)) do (  
4      a := a - 1;  
5      b := b + 1  
6  )  
7
```

정답:

$a \mapsto \text{Top}$

$b \mapsto \text{Pos}$

2) Command:

```
1  a := 10;  
2  b := 20;  
3  c := 0;  
4  while (not (a <= 0) && not (b <= 15))  
5  do (  
6      a := a - 5;  
7      b := b - a;  
8      c := (-1)  
9  )  
9
```

정답:

$a \mapsto \text{Top}$

$b \mapsto \text{Top}$

$c \mapsto \text{NonPos}$

3) Command:

```
1  a := 0;  
2  b := 0;  
3  c := 100;  
4  while (not (c <= a)) do (  
5      a := a + b;  
6      b := b + 2;  
7      c := c - a  
8  )  
9
```

정답:

$a \mapsto \text{NonNeg}$

$b \mapsto \text{NonNeg}$

$c \mapsto \text{Top}$

4) Command:

```
1  a := 10;  
2  b := 0;  
3  while (b <= a) do (  
4      b := b + 1;  
5      a := a - b  
6  );  
7  if (a <= 0) then (  
8      a := a * (-1)  
9  ) else (  
10     b := b * (-1)  
11 )  
12
```

정답:

$a \mapsto \text{Top}$

$b \mapsto \text{Top}$

5) Command:

```
1  a := 10;  
2  b := 0;  
3  c := 5;  
4  while (not (a = b)) do (  
5      b := b + 1;  
6      a := a - 1  
7  );  
8  if (c = a) then (  
9      a := a * 0  
10 ) else (  
11     skip  
12 );  
13 c := 0  
14
```

정답:

$a \mapsto \text{Top}$

$b \mapsto \text{NonNeg}$

$c \mapsto \text{Zero}$

6) Command:

```
1  a := 10;  
2  b := 2;  
3  c := 0;  
4  while (0 <= a) do (  
5      c := c + b;  
6      a := a - b  
7  );  
8  if (c = 10) then (  
9      b := b + a  
10 ) else (  
11     c := c * (-1)  
12 )  
13
```

정답:

$a \mapsto \text{Top}$

$b \mapsto \text{Top}$

$c \mapsto \text{Top}$

7) Command:

```
1  a := 10;  
2  b := 2;  
3  c := 1;  
4  if (not (a <= 0)) then (  
5      while (c <= a) do (  
6          c := c * b;  
7          a := a - b  
8      )  
9  ) else (  
10     skip  
11 );  
12 if (not (not (b <= a) && 0 <= c)) then  
13 (   
14     skip  
15 ) else (  
16     a := c  
17 )
```

정답:

$a \mapsto \text{Top}$

$b \mapsto \text{Pos}$

$c \mapsto \text{Pos}$

8) Command:

```
1  a := 10;  
2  b := 2;  
3  c := 1;  
4  d := 0;  
5  while (c <= 32 && 0 <= a) do (  
6      c := c * b;  
7      a := a - b;  
8      d := d + c  
9  );  
10 if (a <= b) then (  
11     a := 0  
12 ) else (  
13     if (not (d <= 0)) then (  
14         b := b * (-1)  
15     ) else (  
16         c := c * (-1)  
17     )  
18 )  
19
```

정답:

$a \mapsto \text{Top}$

$b \mapsto \text{NonZero}$

$c \mapsto \text{NonZero}$

$d \mapsto \text{NonNeg}$

9) Command:

```
1  s := 10;  
2  d := 5;  
3  a := 1;  
4  while (not (s = d)) do (  
5      a := a * s;  
6      s := s - 1  
7  )  
8
```

정답:

$s \mapsto \text{Top}$

$d \mapsto \text{Pos}$

$a \mapsto \text{Top}$

10) Command:

```
1  a := 1;  
2  b := (-1);  
3  c := a + b;  
4  d := a - b;  
5  e := a * b;  
6  if (a <= b) then (  
7      f := d + e  
8  ) else (  
9      f := d - e  
10 )  
11
```

정답:

$a \mapsto \text{Pos}$

$b \mapsto \text{Neg}$

$c \mapsto \text{Top}$

$d \mapsto \text{Pos}$

$e \mapsto \text{Neg}$

$f \mapsto \text{Pos}$

11) Command:

```
1  x := 0;  
2  while (x <= 10) do (  
3    x := x + 1  
4  )  
5
```

정답:

$x \mapsto \text{NonNeg}$

12) Command:

```
1  x := 27;  
2  y := (-3);  
3  z := x * 2;  
4  z := z - y;  
5  if (not (0 <= x)) then (  
6    y := z - 3  
7  ) else (  
8    y := 12  
9  )  
10
```

정답:

$x \mapsto \text{Pos}$

$y \mapsto \text{Pos}$

$z \mapsto \text{Pos}$

13) Command:

```
1  x := 3;  
2  y := 0;  
3  while (x <= 100) do (  
4    y := x * 2;  
5    if (not (y <= 3)) then (  
6      x := x * y  
7    ) else (  
8      skip  
9    );  
10   z := x - 4;  
11   if (not (z <= 0)) then (  
12     x := x + 1  
13   ) else (  
14     skip  
15   );  
16   z := z - 1  
17 )  
18
```

정답:

$x \mapsto \text{Pos}$

$y \mapsto \text{NonNeg}$

$z \mapsto \text{Top}$

14) Command:

```
1  a := 0;  
2  b := (-10);  
3  z := a + b;  
4  y := a * b;  
5  while (y <= a + b) do (  
6    a := a + 1;  
7    x := a + b  
8  );  
9  z := z * a  
10
```

정답:

$a \mapsto \text{NonNeg}$

$b \mapsto \text{Neg}$

$x \mapsto \text{Top}$

$y \mapsto \text{Zero}$

$z \mapsto \text{NonPos}$

15) Command:

```
1  x := 10;  
2  y := (-10);  
3  z := x + y;  
4  if (z = 0) then (  
5    p := x * y  
6  ) else (  
7    q := x - y  
8  )  
9
```

정답:

$x \mapsto \text{Pos}$

$y \mapsto \text{Neg}$

$z \mapsto \text{Top}$

$p \mapsto \text{Neg}$

$q \mapsto \text{Pos}$

16) Command:

```
1  x := 10;  
2  a := x - (-1);  
3  b := x - 2;  
4  while (not (x <= 0)) do (  
5    x := x + (-1)  
6  );  
7  y := x * 0  
8
```

정답:

$x \mapsto \text{Top}$

$y \mapsto \text{Zero}$

$a \mapsto \text{Pos}$

$b \mapsto \text{Top}$

17) Command:

```
1  x := 1 - 1;  
2  if (not (x = 0)) then (  
3    a := (-10);  
4    b := 10;  
5    c := 10  
6  ) else (  
7    a := 0;  
8    b := 0;  
9    c := (-10)  
10 );  
11 i := a - b;  
12 j := b + c;  
13 k := c * a  
14
```

정답:

$x \mapsto \text{Top}$

$a \mapsto \text{NonPos}$

$b \mapsto \text{NonNeg}$

$c \mapsto \text{NonZero}$

$i \mapsto \text{NonPos}$

$j \mapsto \text{Top}$

$k \mapsto \text{Top}$

18) Command:

```
1  v0 := 4;  
2  v1 := 7;  
3  v2 := 4;  
4  v3 := (-6);  
5  v4 := 0;  
6  v0 := (v4 + (v4 - (v4 + v1))  
7  );  
8  if ( - 3 <= ((4 - v3) * ( - 10))) then  
9  (  
10 v0 := ( - 6 - (v1 - (v4 + v2)))  
11 ) else (  
12 while (v4 <= v1) do (  
13   v4 := (v4 + 6 * (-7))  
14 );  
15 v3 := (0 + v0 * (-7))  
16 )
```

정답:

v0 ↦ Top
v1 ↦ Pos
v2 ↦ Pos
v3 ↦ NonZero
v4 ↦ NonPos

19) Command:

```
1  v0 := (-10);  
2  v1 := (-5);  
3  v2 := (-10);  
4  v3 := 0;  
5  v4 := 4;  
6  if (v1 <= (v1 - (v2 - 2))) then (  
7   v4 := v3  
8  ) else (  
9   v3 := v0;  
10  if (not (True)) then (  
11   v0 := (v1 - 7) - (-3)  
12  ) else (  
13   if (v4 = (v2 - 8)) then (  
14    v2 := 9  
15   ) else (  
16    if (False && True) then (  
17     v0 := 1  
18    ) else (  
19     v2 := (v2 + v2) - 1  
20    )  
21  )  
22 )  
23 )  
24 )
```

정답:

v0 ↦ Neg
v1 ↦ Neg
v2 ↦ Neg
v3 ↦ NonPos
v4 ↦ NonNeg

20) Command:

```
1  v0 := (-10);
2  v1 := (-8);
3  v2 := (-8);
4  v3 := (-1);
5  v4 := 0;
6  if (v2 = v3) then (
7    v1 := 6
8  ) else (
9    v1 := v0;
10   v4 := 4;
11   if (not (True)) then (
12     v4 := (-3)
13   ) else (
14     v4 := v2
15   )
16 )
17
```

정답:

v0 ↦ Neg

v1 ↦ NonZero

v2 ↦ Neg

v3 ↦ Neg

v4 ↦ NonPos

21) Command:

```
1  v0 := (-8);
2  v1 := (-5);
3  v2 := (-7);
4  v3 := (-2);
5  v4 := 3;
6  v3 := (4 + v2);
7  while (False) do (
8    if ((-1) = (v0 * v1 + 7)) then (
9      v1 := (3 - (-1))
10    ) else (
11      v0 := 2;
12      if (True && True) then (
13        v3 := (v1 + v0)
14      ) else (
15        v4 := (v2 + v0) * v4
16      )
17    )
18  )
19
```

정답:

v0 ↦ NonZero

v1 ↦ NonZero

v2 ↦ Neg

v3 ↦ Top

v4 ↦ Pos

22) Command:

```
1  v0 := 4;  
2  v1 := 3;  
3  v2 := 9;  
4  v3 := 8;  
5  v4 := 3;  
6  if (v3 <= (v4 * v2 - (-7))) then (  
7    v1 := (v0 + v4)  
8  ) else (  
9    if (((-5) + ((-6) + v0)) <= 9) then (  
10     v4 := (0 + 0)  
11   ) else (  
12     v3 := (v1 + v1 * v1);  
13     v3 := (4 + (v0 + (v0 + v3)));  
14     v0 := v2;  
15     v1 := (-6)  
16   )  
17 )  
18
```

정답:

v0 \mapsto Pos
v1 \mapsto NonZero
v2 \mapsto Pos
v3 \mapsto Pos
v4 \mapsto NonNeg

23) Command:

```
1  v0 := (-8);  
2  v1 := 8;  
3  v2 := (-7);  
4  v3 := (-8);  
5  v4 := 4;  
6  if ((v1 - (v3 + v4)) = v2) then (  
7    skip  
8  ) else (  
9    v1 := 7;  
10   if (v0 = (v3 - (v0 + (-6)))) then (  
11     v3 := (-8) * v2  
12   ) else (  
13     v0 := v3;  
14     if (v2 <= (v2 + v2) * v4) then (  
15       v0 := 0  
16     ) else (  
17       v1 := (-2)  
18     )  
19   )  
20 )  
21
```

정답:

v0 \mapsto NonPos
v1 \mapsto NonZero
v2 \mapsto Neg
v3 \mapsto NonZero
v4 \mapsto Pos

24) Command:

```
1  v0 := (-3);
2  v1 := 6;
3  v2 := 9;
4  v3 := (-4);
5  v4 := (-4);
6  if (v3 = v4) then (
7    v0 := (-9)
8  ) else (
9    if ((5 - (v1 + v3)) <= v1) then (
10     v0 := v2
11   ) else (
12     v0 := v3 * (v3 - v2 * v1);
13     if ((v3 + (v1 - v4)) <= 1) then (
14       v4 := 0
15     ) else (
16       while (not (True)) do (
17         v2 := v3
18       )
19     )
20   )
21 )
22
```

정답:

v0 ↦ NonZero

v1 ↦ Pos

v2 ↦ NonZero

v3 ↦ Neg

v4 ↦ NonPos

25) Command:

```
1  v0 := 0;
2  v1 := (-3);
3  v2 := 0;
4  v3 := 1;
5  v4 := (-7);
6  if (False && True) then (
7    v2 := v2
8  ) else (
9    v1 := ((v1 - v4) - v2);
10   if (v4 = (v2 + (-7))) then (
11     v0 := ((v1 - v3) - (-6))
12   ) else (
13     v0 := (v1 + (v3 - 5));
14     v3 := v2;
15     v4 := (-9)
16   )
17 )
18
```

정답:

v0 ↦ Top

v1 ↦ Top

v2 ↦ Zero

v3 ↦ NonNeg

v4 ↦ Neg