CSC410 A5

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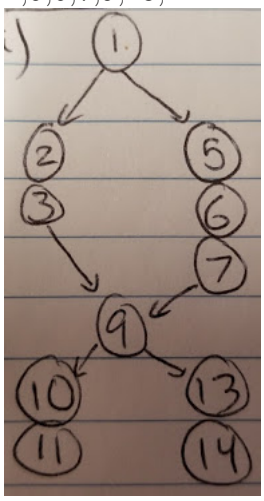
1. (a) All Paths:
1,2,3,9,10,11
1,2,3,9,13,14
1,5,6,7,9,10,11
1,5,6,7,9,13,14



(b)

Infeasible Path		
Line No.	Assignment	Path Conditions
1,2,3	$x \leftarrow X - 5$ $y \leftarrow Y + 5$	$X + Y > 10$
9,10,11	$x \leftarrow -(X - 5)$ $y \leftarrow -(Y + 5)$	$X + Y > 10$ AND $(X - 5) + (Y + 5) < 0$

This path is infeasible because of the conflicting path conditions.
$10 < (X + Y) = (X - 5) + (Y + 5) \not< 0$.

(c)

Assertion Violation Path		
Line No.	Assignment	Path Conditions
1,5,6,7	$x \leftarrow Y$ $y \leftarrow X$	$X + Y \leq 10$
9,13,14	$x \leftarrow Y - 1$ $y \leftarrow X - 1$	$X + Y \leq 10$ AND $X + Y \geq 0$

This path will cause an assertion violation in the case that $X+Y \leq 2$ since the assignments from 9,13,14 subtract 2 from the sum, $(X-1)+(Y-1) = X+Y-2$

Why the other 2 paths never cause an assertion violation:

Assertion Violation Path		
Line No.	Assignment	Path Conditions
1,5,6,7	$x \leftarrow Y$ $y \leftarrow X$	$X + Y \leq 10$
9,10,11	$x \leftarrow -Y$ $y \leftarrow -X$	$X + Y \leq 10$ AND $X + Y < 0$

Since $x \leftarrow -Y$ and $y \leftarrow -X$ and $X + Y < 0$ then $(X-1) + (Y-1) = -(X+Y) > 0$

Assertion Violation Path		
Line No.	Assignment	Path Conditions
1,2,3	$x \leftarrow X - 5$ $y \leftarrow Y + 5$	$X + Y > 10$
9,13,14	$x \leftarrow (X-5) - 1 = X - 6$ $y \leftarrow (Y+5) - 1 = Y + 4$	$X + Y > 10$ AND $X + Y \geq 0$

Since $X+Y > 10$ then $(X-6)+(Y+4) = X+Y-2 > 10-2 = 8$ therefore $x + y > 0$

2.

3.

4.

5.

6.

7.