

## 15F-1 Bookkeeping

- 0 pts Correct

5F-2 VCGen - Do-While

$$\text{Inv}_1 \wedge (\forall x_1 \dots x_n. \text{Inv}_1 \Rightarrow \text{VC}(c, \text{Inv}_2) \wedge (\forall x_1 \dots x_n. \text{Inv}_2 \Rightarrow (b \Rightarrow \text{Inv}_1 \wedge \neg b \Rightarrow P)))$$

5F-3 VCGen - Mistakes

① Stark.

1.  $A = \{y \leq 5\}$

2.  $B = \{y = 5\}$

3.  $b = \{y = 0\}$

4.  $b' = \{y = 5\}$

5.  $c = \text{while } y < 5 \text{ do } y = y + 1$

6. It's convincing to verify that  $\langle c, b \rangle \Downarrow b'$ ;  $b' \models A$  and  $b' \models B$

7. It's impossible to prove  $A \vdash A \circ b$  given the stark rule. Since there is no loop guard representation in the stark rule. We have no evidence to judge that after stark rule, in our case,  $\{y \geq 5\}$ . As a result, we can't prove  $B$   $\{y = 5\}$  by using  $\{y \geq 5 \wedge y \leq 5\} \Rightarrow \{y = 5\}$ . It prevents us from a proof.

② targaryan.

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5.  $c = \text{while } y < 5 \text{ do } (\text{if } y < 5 \text{ then } y = y + 1 \text{ else } y = 10)$

6. It's easy to verify that  $\langle c, b \rangle \Downarrow b'$ ;  $b' \models A$  and  $b' \models B$

7. It's impossible to prove  $A \vdash A \circ b$  given the targaryan rule. Because in the targaryan rule, we have no idea about the condition of  $b$ . So even if the inner branch statement has some condition with the outer loop condition, using targaryan rule, it's not reasonable enough to say we will never execute  $y = 10$ . But once we execute it,  $b' = \{y = 5\}$  doesn't hold. And  $y = 10$  will also satisfy the  $\neg b$ . That is why it is impossible to show that  $A \circ b$

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