1 5F-1 Bookkeeping

- **0 pts** Correct

Exercise 5F-2.

$$\text{VC}(c, Inv \wedge \forall x_1 ... x_n . Inv \implies (e \implies \text{VC}(c, Inv) \wedge \neg e \implies B))$$

Exercise 5F-3.

First rule:

1. targaryen
2. $x > 10$
3. $x > 10 \ \wedge \ x <= 11$
4. $x := 14$
5. $x := 11$
6. while $x > 11$ do $x := x - 1$
7. Calling the while loop will cause x to become 13, 12, 11, then exit.
8. $14 > 10$
9. $11 > 10 \ \wedge \ 11 <= 11$
10. targaryan cannot prove that $\vdash \{x > 10\}$ while $x > 11$ do $x := x-1 \{x > 10 \wedge x <= 11\}$, since it will then have to prove $\vdash \{x > 10\} \ x := x - 1 \ \{x > 10\}$, which fails since $11 - 1 = 10$ and thus fails the postcondition even with a valid precodition.

Second rule:

1. lannister
2. $x < 10 \implies$ true $\wedge \ x >= 10 \implies x = 10$
3. $x = 10$
4. $x := 5$
5. $x := 10$
6. while $x < 10$ do $x := x + 1$
7. Calling the while loop will cause x to become 6, 7, 8, 9, 10, then exit.

2 5F-2 VCGen Do-While

- **0 pts** Correct

Exercise 5F-2.

$$\text{VC}(c, Inv \wedge \forall x_1 ... x_n . Inv \implies (e \implies \text{VC}(c, Inv) \wedge \neg e \implies B))$$

Exercise 5F-3.

First rule:

1. targaryen
2. $x > 10$
3. $x > 10 \ \wedge \ x <= 11$
4. $x := 14$
5. $x := 11$
6. while $x > 11$ do $x := x - 1$
7. Calling the while loop will cause x to become 13, 12, 11, then exit.
8. $14 > 10$
9. $11 > 10 \ \wedge \ 11 <= 11$
10. targaryan cannot prove that $\vdash \{x > 10\}$ while $x > 11$ do $x := x-1 \{x > 10 \wedge x <= 11\}$, since it will then have to prove $\vdash \{x > 10\} \ x := x - 1 \ \{x > 10\}$, which fails since $11 - 1 = 10$ and thus fails the postcondition even with a valid precodition.

Second rule:

1. lannister
2. $x < 10 \implies$ true $\wedge \ x >= 10 \implies x = 10$
3. $x = 10$
4. $x := 5$
5. $x := 10$
6. while $x < 10$ do $x := x + 1$
7. Calling the while loop will cause x to become 6, 7, 8, 9, 10, then exit.

8. $5 < 10 \implies \mathsf{true} \wedge 5 >= 10 \implies 5 = 10$

9. $10 = 10$

10. lannister cannot prove that $\vdash \{x < 10 \implies \mathsf{true} \wedge x >= 10 \implies x = 10\}$ while $x < 10$ do $x := x + 1$ $\{x = 10\}$, since it will then have to prove $\vdash \{true\}$ $x := x + 1$ $\{x < 10 \implies \mathsf{true} \wedge x >= 10 \implies x = 10\}$, which fails since true as a precondition can't imply anything.

3 5F-3 VCGen Mistakes

- **0 pts** Correct