# Advanced: Relative Induction

- Inductive Invariant:
  - $a \geq 0 \wedge b \geq 0 \wedge c \geq 0$
- Incremental induction
  - Guess: $a \geq 0$
  - Induction: $c \geq 0$, *relative* to $a \geq 0$
  - Induction: $b \geq 0$, *relative* to $a \geq 0 \wedge c \geq 0$
  - Prove: $a \geq 0$
- Break circularity with induction

```
a = 0 ; b = 0 ; c = 0
while * do:
    assert a ≥ 0
    a' = a + b
    b' = b + c
    c' = c + 1 + a
```

Credit for Example: Oded Padon