Exercises: Hoare Logic

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1 Axiom Schema of Assignment

a) Which of the following, if any, are instances of the axiom schema of Assignment?

- $\{2 = 2\}\, x := 2\, \{x = 2\}$
- $\{2 = 4\}\, x := 2\, \{x = 4\}$
- $\{2 = y\}\, x := 2\, \{x = y\}$
- $\{2 > 0\}\, x := 2\, \{x > 0\}$
- $\{2 > 0\}\, x := 2\, \{2 > 0\}$

b) Why don't $\overline{\{p\}\, x := e\, \{p[e/x]\}}$ or $\overline{\{p\}\, x := e\, \{p[x/e]\}}$ work as Assignment axioms? Give counterexamples.

2 A short proof

Using the axioms and rules of Hoare, prove $\{x \geq 0\}Copy1\{x = y\}$, where $Copy1$ is the following program:

a := x;
y := 0;
while a $\neq$ 0 **do** y := y + 1 ; a := a - 1 **od**