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$$\langle x, \sigma \rangle \rightarrow \text{const}^7 \quad \langle y, \sigma \rangle \rightarrow \text{const}^2$$

$$\langle x, \sigma \rangle \rightarrow \text{const}^7 \quad \langle y, \sigma \rangle \rightarrow \text{const}^2$$

$$\langle x+y, \sigma \rangle \rightarrow \text{const}^9$$

$$\langle x > y, \sigma \rangle \rightarrow \text{true}$$

$$\langle y := x+y, \sigma \rangle \rightarrow \sigma'$$

$$\langle \text{if } x > y \text{ then } y := x+y \text{ else } y := x-y, \sigma \rangle \rightarrow \sigma'$$

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2. (a)(c)(d)(e)(g)(i) are valid.

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$$3. \quad \{ \text{true} \wedge x < y \} \Rightarrow (y-x)-1 \leq -1 \quad \{ (y-x)-1 \leq -1 \} \quad z := (y-x)-1 \quad \{ z \leq -1 \}$$

$$\{ \text{true} \wedge x < y \} \quad z := (y-x)-1 \quad \{ z \leq -1 \}$$

$$\{ \text{true} \wedge \neg(x < y) \} \Rightarrow (x-y)-1 \leq -1 \quad \{ (x-y)-1 \leq -1 \} \quad z := (x-y)-1 \quad \{ z \leq -1 \}$$

$$\{ \text{true} \wedge \neg(x < y) \} \quad z := (x-y)-1 \quad \{ z \leq -1 \}$$

$$z \leq -1 \Rightarrow 1-12 \cdot z \geq 10 \quad \{ 1-12 \cdot z \geq 10 \} \quad z := 1-12 \cdot z \quad \{ z \geq 10 \}$$

$$\{ \text{true} \} \text{ if } x > y \text{ then } z := (y-x)-1 \text{ else } z := (x-y)-1; \{ x \leq -1 \} \quad \{ x \leq -1 \} \quad z := 1-12 \cdot z \quad \{ z \geq 10 \}$$

$$\{ \text{true} \} \text{ if } x > y \text{ then } z := (y-x)-1 \text{ else } z := (x-y)-1; z := 1-12 \cdot z \quad \{ z \geq 10 \}$$