# 6341 Homework 3

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1.

$$\frac{\langle x,\sigma\rangle \to \text{const} \quad \langle y,\sigma\rangle \to \text{const}}{\langle x>y,\sigma\rangle \to \text{true}} \qquad \frac{\langle x,\sigma\rangle \to \text{const} \quad \langle y,\sigma\rangle \to \text{const}}{\langle x+y,\sigma\rangle \to \text{const}} \quad \frac{}{\langle y := x+y,\sigma\rangle \to \sigma'}$$

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

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

3.

$$\frac{(\text{true}\wedge x<y)\Rightarrow (y-x)-1\le -1 \quad \{(y-x)-1\le -1\}\, z:=(y-x)-1\, \{z\le -1\}}{\{\text{true}\wedge x<y\}\, z:=(y-x)-1\, \{z\le -1\}}$$

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

$$\frac{z\le -1 \Rightarrow 1-12*z\ge 10 \quad \{1-12*z\ge 10\}\, z:=1-12*z\, \{z\ge 10\}}{\{x\le -1\}\, z:=1-12*z\, \{z\ge 10\}}$$

$$\{\text{true}\}\ \text{if } x>y \text{ then } z:=(y-x)-1 \text{ else } z:=(x-y)-1;\ \{x\le -1\}$$

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