if it must be an integer, then the answers in red are correct

Final2022PLC — Preston Powell

11.

a) $a = 2 * (b - 1) - 1 \quad \{a > 0\}$

weakest precondition is $\{b > 1.5\}$ $\{b > 2\}$

b)
```
if (x < y)
    x = x + 1
else
    x = 3 * x
```
$\{x < 0\}$

$x = x + 1 \quad \{x < 0\} \rightarrow \{x + 1 < 0\} \quad \{x + 1 < 0\} \Rightarrow \{3 \cdot x < 0\}$

$x = 3 * x \quad \{x < 0\} \rightarrow \{3 * x < 0\}$

wpc = $\{x + 1 < 0\} \Rightarrow \{x < -1\} \Rightarrow \{y = -1\}$

c)
```
y = a · 2 · (b - 1) - 1
if (x < y)
    x = y + 1
else
    x = 3 · x
```
$\{x < 0\}$

$x = y + 1 \quad \{x < 0\} \quad y + 1 = 0 \quad y = -1 \quad \{y < -1\}$

$x = 3 \cdot x \quad \{x < 0\} \quad 3x \leq 0 \quad \{x < 0\}$

$\{y < -1\}$

$a \cdot 2 \cdot (b - 1) - 1 < -1$

$a \cdot 2 \cdot (b - 1) < 0$

$\{a \cdot (b - 1) < 0\} \Rightarrow \{a < 0\}, \{b < 1\}$

d) $a = 3 \cdot (2 \cdot b + a)$

$b = 2 \cdot a - 1$

$\{ b > 5 \}$

$2 \cdot a - 1 > 5 \rightarrow 2 \cdot a > 6 \rightarrow \{a > 3\}$

$a = 3 \cdot (2 \cdot b + a) \{a > 3\} \rightarrow 6b + 6 = 3 \quad 6b = -3$ $\boxed{\{b > -0.5\}}$

$\{ b > 0 \}$