EXERCISES 1.6

Note: In the following exercises, * denotes multiplication.

★ 1. According to the assignment rule, what is the precondition in the following program segment?

{precondition}
$x = x + 1$
$\{x = y - 1\}$

2. According to the assignment rule, what is the precondition in the following program segment?

{precondition}
$x = 2 * x$
$\{x > y\}$

3. According to the assignment rule, what is the precondition in the following program segment?

{precondition}
$x = 3 * x - 1$
$\{x = 2 * y - 1\}$

4. Verify the correctness of the following program segment with the precondition and post-condition shown.

$\{x = 1\}$
$y = x + 3$
$y = 2 * y$
$\{y = 8\}$

5. Verify the correctness of the following program segment with the precondition and post-condition shown.

$\{x > 0\}$
$y = x + 2$
$z = y + 1$
$\{z > 3\}$

6. Verify the correctness of the following program segment with the precondition and post-condition shown.

$\{x = 0\}$
$z = 2 * x + 1$
$y = z - 1$
$\{y = 0\}$

7. Verify the correctness of the following program segment with the precondition and postcondition shown.

```
{x < 8}
  z = x − 1
  y = z − 5
{y < 2}
```

★ 8. Verify the correctness of the following program segment to compute $y = x(x - 1)$.

```
y = x − 1
y = x * y
```

9. Verify the correctness of the following program segment to compute $y = 2x + 1$.

```
y = x
y = y + y
y = y + 1
```

★ 10. Verify the correctness of the following program segment with the precondition and postcondition shown.

```
{y = 0}
  if y < 5 then
    y = y + 1
  else
    y = 5
  end if
{y = 1}
```

11. Verify the correctness of the following program segment with the precondition and postcondition shown.

```
{x = 7}
  if x <= 0 then
    y = x
  else
    y = 2 * x
  end if
{y = 14}
```

12. Verify the correctness of the following program segment with the precondition and postcondition shown.

```
{x ≠ 0}
  if x > 0 then
    y = 2 * x
  else
    y = (−2) * x
  end if
{y > 0}
```