Homework 4 (pen and paper)

Problem 1

```
reverse(int[] b) {
    int l = 0;
    int r = n - 1;

    while(l < r) {

        int t = b[l];
        b[l] = b[r];
        b[r] = t;

        l = l + 1;
        r = r - 1;
    }
}
```

In this exercise, assume that `n` denotes the length of array `b` and that run-time exceptions like array-index-out-of-bounds do not occur.

1. Given the precondition
$$P : n > 0 \wedge \forall i.(0 \leq i < n) \rightarrow (b[i] = b_0[i])$$
find the strongest postcondition expressing that the array has been reversed.

2. Convert the **method** body into guarded command language.

3. Convert the **loop** body into a formula $F(l, r, b, n, l', r', b', n')$. Show your steps. You only need to give a formula for the body itself, i.e. you do not need to find the formula for the transitive closure.

4. Give the loop invariant and show that it is inductive. For the proof, you should use the formula you developed in part 3 and the style of proof from Homework 1, Problem 1.