Tema 12

```
method between(p: int, r: int) returns (q: int)
    requires r-p > 1 ensures p < q < r {
    q := p + 1;
}

method Main() {
    var q: int;
    q := between(2, 5);
    print(q);
}
```

1. What does the program do? What is the precondition? What is the postcondition?
   [R]: The method between takes two integers, p and r, and returns an integer q, such that p < q < r. The integer q is set as q = p + 1.

   Precondition: requires r - p > 1
   The difference between r and p, the passed arguments of method between, should be grater than 1.

   Postcondition: ensures p < q < r
   The returned integer should be greater than p and less than r.

2. What happens if you change the body of the method with q := p + 2? Give a counterexample.
   [R]: If we change the body with q := p + 2, the postcondition will not be fulfilled. For example, if we pass the arguments p = 2 and r = 4 (4 - 2 > 1 ✅), q will be p + 2 = 2 + 2 = 4, which doesn't check the postcondition: 2 < 4 < 4 (4 < 4 ❌).

3. What happens if you change the precondition with r - p ≥ 1? Give a counterexample.
   [R]: If we change the precondition from r - p > 1 to r - p ≥ 1, the postcondition will not be checked. For example, if we pass as arguments p = 2 and r = 3 (3 - 2 ≥ 1 ✅), the returned integer q = 2 + 1 = 3, which doesn't check the postcondition: 2 < 3 < 3 (3 < 3 ❌).