

DOCUMENTATION:

References:

- Grassmann, Winfried K., Jean-Paul Tremblay (1996). Logic and Discrete Mathematics.
- Manual de Frama-C WP.

```
/*@
requires \valid(i) && \valid(j);    -- Valid pointers
requires (*i == 0 && *j == -2);    -- Exact precondition
assigns *i, *j;                    -- Modified variables
ensures *i * *j == 6;              -- Required postcondition
*/
void ejercicio(int *i, int *j) {
    *j = 3;                        -- Direct assignment for j (originally -2)
    *i = 2;                        -- Direct assignment for i (originally 0)
}
```

1. Mathematical Proof

- Precondition:

Given $i = 0$ and $j = -2$:
 $0 * (-2) + 2 * (-2) + 3 * 0 = 0$

- Transformation:

Asigna $j=3$ (cumple $j' = j+3$)
Asigna $i=2$ (cumple $i' = i+2$)

- Postcondition:

$2 * 3 = 6$ check the required condition

2. Verification Process

- Tools Used:

- . Frama-C 30.0 (Zinc) with WP plugin.
- . Alt-Ergo 2.6.1 (prover).

- Command:

frama-c -wp practice3.c

- Result:

[wp] Proved goals: 5 / 5

Terminating: 1	-- Guaranteed completion
Unreachable: 1	-- Unreachable code
Qed: 2 (0.92ms)	-- Objectives solved by Qed
Alt-Ergo: 1 (12ms)	-- Objective solved by Alt-Ergo

3. Limitations

- The code only works for inputs $i=0, j=-2$.