

**Exercises**

(2) 1. Construct a WHILE program that computes the partial function  $\log(x) = (\mu y)(x = 2^y)$ .

(2) 2. Prove that the function

$$f(x) = \begin{cases} 2 & \text{if } x \text{ is even} \\ \text{undefined} & \text{if } x \text{ is odd} \end{cases}$$

is partial recursive.

(2) 3. Construct a WHILE program that computes the function

$$f(x) = \begin{cases} \text{undefined} & \text{if } x = y^2 \text{ for some } y \geq 0 \\ x - 1 & \text{otherwise} \end{cases}$$

(1) 4. Determine the level in the Grzegorzcyk hierarchy of multiplication.