universität innsbruck

Computability Theory	26W	LVA 703317
Lecture 4		November 16, 2026

Solved exercises must be marked and solutions (as a single PDF file) uploaded in OLAT. Solutions for bonus exercises must be submitted separately. The (strict) deadline is 10 am on November 16.

Exercises

⟨2⟩ 1. Construct a while program that computes the partial function $\mathsf{log}(x) = (\mu\, y)\,(x = 2^y)$.

⟨1⟩ 2. Prove that the function

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

is partial recursive.

⟨2⟩ 3. Construct a while program that computes the function

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

⟨1⟩ 4. Determine the level in the Grzegorczyk hierarchy of multiplication.

⟨3⟩ 5. Prove that E is closed under bounded recursion.

Bonus Exercise

⟨3⟩ 6. Prove that E and E_3 coincide.