

Module 5: Assignment 1

April 13, 2022

1. Describe the initial functions over $\mathbb{N}$.
2. Describe the initial functions over $\Sigma = \{a, b\}$.
3. Define $n!$ by recursion.
4. Show that the function $f_1(x, y) = x + y$ is primitive recursive.
5. The function $f_2(x, y) = x * y$ is primitive recursive
6. Show that $f(x, y) = x^y$ is a primitive recursive function
7. Show that $f(x, y) = x^2y^4 + 7xy^3 + 4y^5$ is a primitive recursive.
8. Show that $f(x) = x/2$ is a partial recursive function over $\mathbb{N}$.
9. If $f(x_1, x_2)$ is primitive recursive, show that $g(x_1, x_2, x_3, x_4) = f(x_1, x_4)$ is primitive recursive.
10. If $f(x, y)$ is primitive recursive, show that $g(x, y) = f(4, y)$ is primitive recursive.
11. Show that the characteristic function of the set of all even numbers is recursive.
12. Prove that the characteristic function of the set of all odd integers is recursive.
13. Show that the function $f(x, y) = x - y$ is partial recursive.
14. State Church's Hypothesis about computability of a machine.