

LAB 6

Recursive functions

PROBLEM 6.1 (Recursive functions). What does each of the following functions do?

(a) `fun[x_] := If[x==0, "It's zero", "It's not zero"]`

(b) `func[x_] := x*func[x-1]`

(c) `funct[x_] := If[x==0, 1, x*funct[x-1]]`

(d) `foo[x_,y_] := If[y==0, 0, x+foo[x,y-1]]`

PROBLEM 6.2. Write a recursive function `Div[a_,b_]` that returns the pair $\{\text{Quo}(a,b), \text{Rem}(a,b)\}$. Watch out for weird cases.

PROBLEM 6.3. Write two negation functions (mod m).

(a) `CleverNegate[a_,m_]`, which uses your *Div* function; and

- (b) `SillyNegate[a_,m_]`, which checks all the numbers $b = 0, \dots, m - 1$ to check whether $b + a \equiv 0 \pmod{m}$. Hint: what does the following do?
`Do[If[b == 3, Return[b]; Break[], Print["looking"]], {b, 0, 5}]`

PROBLEM 6.4. Compare the speeds of `CleverNegate` and `SillyNegate` for large a and m using the `Timing` command.

PROBLEM 6.5. Write a recursive function `MyGCD[a_,b_]`. How does its speed compare with Mathematica's `GCD` function?