

Advanced Algorithms

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Academic Year 2013-2014

Lab 2 – Solutions of assignment

Assignment 01

Exercise 0.1 page 8 DPV

○ Solution

- i) $n^{0.1} = \Omega((\log n)^{10})$
- j) $(\log n)^{\log n} = \Omega(n/\log n)$
- k) $\sqrt{n} = \Omega((\log n)^3)$
- l) $n^{1/2} = O(5^{\log_2 n})$
- m) $n2^n = O(3^n)$



Assignment 01 (cont.)

Exercise

○ Solution

```
function f = fib3(n)
A=[0 1; 1 1];
Fib_01 = [0; 1];
Fib_nn1 = A^n * Fib_01;
f = Fib_nn1(1);
```



Assignment 01 (cont.)

Exercise 1.7 page 39 DPV

○ Solution

Assume we want to multiply the n -bit number x with the m -bit number y . The algorithm must terminate after m recursive calls, because at each call y is halved (the number of digits is decreased by one). Each recursive call requires a division by 2, a check for even-odd, a multiplication by 2 (all of those take constant time) and a possible addition of x to the current result (which takes $O(n)$ time) so total $O(m \cdot n)$ time

