Algorithms, Spring 1997

Assignment 1

Due in one week.

3.5 a,b of Manber

Problem 2 Consider the following program :

$x_0 := 0; x_1 := 0; \ldots x_n := 0.$

while $x_n = 0$ do :

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    i = 0.
    while x_i = 1 do
        i := i + 1;
    x_i := 1;
    for j = 0 to i − 1 by 1 do
        x_j := 0;
    Print (x_n x_{n−1} x_{n−2} ... x_0) on a new line;
```

a) Argue that the above program prints succesive integers upto 2^n.

b) Show that the program takes time $O(n)$ for each integer printed out.

c) Show that it takes $O(2^n)$ steps in all.

d) a) and b) toegther imply that the program takes time $O(n2^n)$, but c) says that it takes time only $O(2^n)$. Is there a contradiction ? Give a brief explanation.